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## **CLASS 706, DATA PROCESSING - ARTIFICIAL INTELLIGENCE**

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### **SECTION I - CLASS DEFINITION**

#### **GENERAL STATEMENT OF THE CLASS SUBJECT MATTER**

This is a generic class for artificial intelligence type computers and digital data processing systems and corresponding data processing methods and products for emulation of intelligence (i.e., knowledge based systems, reasoning systems, and knowledge acquisition systems); and including systems for reasoning with uncertainty (e.g., fuzzy logic systems), adaptive systems, machine learning systems, and artificial neural networks.

(1) Note. This class includes systems having a faculty of perception or learning.

(2) Note. This class also provides for data processing systems and corresponding data processing methods for performing automated mathematical or logic theorem proving.

### **SECTION II - REFERENCES TO OTHER CLASSES**

#### **SEE OR SEARCH CLASS:**

- 235, Registers, appropriate subclasses for basic machines and associated indicating mechanisms for ascertaining the number of movements of various devices and machines, plus machines made from these basic machines alone (e.g., cash registers, voting machines) and in combination with various perfecting features, such as printers and recording means. In addition, search Class 235, various subclasses for data bearing record controlled systems.
- 326, Electrical Digital Logic Circuitry, appropriate subclasses for generic digital logic devices, circuitry, and subcombinations thereof, wherein nonarithmetical operations are performed upon discrete electrical signals representing a value normally described by numerical digits.
- 340, Communications: Electrical, subclasses 825+ for controlling one or more devices to obtain plurality of results by transmission of a designated one of plural distinctive control signals over a smaller number of communication lines or channels.
- 341, Coded Data Generation or Conversion, various subclasses for electrical pulse and digit code converters (e.g., systems for originating or emitting a coded set of discrete signals or translating one code into another code wherein the meaning of the data remains the same but the formats may differ.
- 345, Computer Graphics Processing, Operator Interface Processing and Selective Visual Display Systems, subclasses 418 through 475 for computer graphics processing and subclasses 700-867 for computer operator interface.
- 360, Dynamic Magnetic Information Storage and Retrieval, various subclasses for record carriers and systems wherein information is stored and retrieved by interaction with a medium and there is relative motion between a medium and a transducer.

- 365, Static Information Storage and Retrieval, various subclasses for addressable static singular storage elements of plural singular elements of the same type (i.e., internal elements of memory, per se).
- 369, Dynamic Information Storage and Retrieval, various subclasses for record carriers and systems wherein information is stored and retrieved by interaction with a medium and there is relative motion between a medium and a transducer.
- 370, Multiplex Communications, subclasses 464+ for communication techniques having information carried in plural channels.
- 375, Pulse or Digital Communications, various subclasses for pulse or digital communication systems and synchronization of clocking signals from input data.
- 377, Electrical Pulse Counters, Pulse Dividers, and Shift Registers, various subclasses for generic circuits for pulse counting.
- 379, Telephonic Communications, various subclasses for two-way electrical communication of intelligible audio information of arbitrary content over a link including an electrical conductor.
- 380, Cryptography, subclasses 3+ for stored information access or copy prevention (e.g., software program protection or virus detection) in combination with data encryption and subclasses 22 through 25 and 50 for electric signal modification.
- 381, Electrical Audio Signal Processing Systems and Devices, various subclasses for wired one-way audio systems, per se.
- 382, Image Analysis, subclasses 181+ for pattern recognition involving image analysis. (From Section I, CLASS DEFINITION.)
- 382, Image Analysis, various subclasses for operations performed on image data with the aim of measuring a characteristic of an image, detecting variations, detecting structures, or transforming the image data, and for procedures for analyzing and categorizing patterns present in image data.
- 388, Electricity: Motor Control Systems, cross-reference art collection 907.5 for computer or processor control of DC motor acceleration or speed.
- 452, Butchering, subclasses 79 and 178 for a handling device (e.g., traversing hoist) which is peculiar to that art.
- 455, Telecommunications, appropriate subclasses for modulated carrier wave communication, per se, and subclass 26.1 for subject matter which blocks access to a signal source or otherwise limits usage of modulated carrier equipment.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for generic data processing control systems, subclasses 90-306 for applications of computers in various environments, and subclasses 245-264 for data processing of robot control systems.
- 702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses for applications of computers in measuring and testing.
- 703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, appropriate subclasses.
- 704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 200+ for artificial intelligence systems that process speech signals.
- 707, Data Processing: Database and File Management, Data Structures and Document Processing, subclasses 1+ , 100+ and 200+ for database or file management.
- 711, Electrical Computers and Digital Processing Systems: Memory, subclasses 100+ for storage accessing and control in data processing systems, and subclasses 200+ for address formation.
- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 1 through 9 for hybrid computers; subclasses 100-714 for calculators, digital signal processing, and arithmetical processing, per se; and subclasses 800-854 for electric analog computers.
- 709, Electrical Computers and Digital Processing Systems: Multicomputer Data Transferring or

Plural Processor Synchronization, subclasses 200 through 253 for multicomputer data transferring, and subclass 400 for synchronization of plural processors.

- 710, Electrical Computers and Digital Data Processing Systems: Input/Output, subclasses 100 through 317 for intrasystem connecting, subclass 200 for access locking, subclass 220 for access polling, subclasses 240-244 for access arbitrating, and subclasses 260-269 for interrupt processing.
- 712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclasses 1 through 43 for processing architecture.
- 713, Electrical Computers and Digital Processing Systems: Support, subclasses 200 through 202 for data processing security, subclasses 300-340 for power control; subclasses 400 and 401 for synchronization of clock or timing signals, data, or pulses; subclasses 500-503 for clock, pulse, or timing signal generation or analysis; and subclasses 600 and 601 for clock control of data processing system, component, or data transmission.
- 714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for generic computer, or electrical pules code or pulse coded data error prevention, detection or correction.
- 717, Data Processing: Software Development, Installation, and Management, appropriate subclasses.
- 718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for a task management system.

### **SECTION III - GLOSSARY**

The terms below have been defined for purposes of classification in this class and are shown in underline type when used in the class and subclass definitions. When these terms are not underlined in the definitions, the meaning is not restricted to the glossary definitions below.

#### **COMPUTER**

A machine that inputs data, processes data, stores data and outputs data.

#### **COMPUTER PROGRAM**

An algorithm and data structures constituting a set of instructions in some computer language, intended to be executed on a computer to perform a useful task.

#### **COMPUTER-READABLE STORAGE MEDIA**

Physical material on which data bits are read and written by a computer; excluding paper and other non-computer written media.

#### **DATA**

Representation of information in a coded manner suitable for communication, interpretation or processing.

#### **DATA PROCESSING**

See PROCESSING, below

#### **GENERAL PURPOSE DIGITAL COMPUTER**

Digital computer having a single central processing unit, primarily storage, at least one input

device, and a display media.

**INFORMATION**

Meaning that a human being assigns to data by means of conventions applied to that data.

**MEMORY**

A functional unit to which data can be stored and which data can be retrieved.

**MODULAR NEURAL NETWORK**

A system of plural neural networks, often of heterogeneous types; e.g., self-organizing network connected to a feedforward network.

**NEURAL NETWORK ARCHITECTURE**

Neural Network Topology and functions computed by the neuron processors.

**NEURAL NETWORK TOPOLOGY**

Interconnection pattern between neuron processors.

**PERIPHERAL**

A functional unit that transmits data to or receives data from a computer to which it is coupled

**PROCESSING**

Methods or apparatus performing systematic operations upon data or information exemplified by functions such as data or information transferring, merging, sorting and computing (i.e., arithmetic operations or logical operations).

(1) Note. In this class, the glossary term data is used to modify processing in the term data processing; whereas the term digital data processing system refers to a machine performing data processing.

**PROCESSOR**

A functional unit that interprets and executes instruction data.

**SUBCLASSES**

**1 FUZZY LOGIC HARDWARE:**

This subclass is indented under the class definition. Subject matter comprising a specific circuit arrangement for performing approximate reasoning where truth values and quantifiers are represented by possibility distributions.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 52, for knowledge processing system using fuzzy logic and having no fuzzy logic hardware.
- 900, for cross-reference art collection of a data processing system having fuzzy logic data processing.

SEE OR SEARCH CLASS:

- 326, Electrical Digital Logic Circuitry, subclasses 59+ for logic circuits responsive to three or more logic signal states, or produces three or more different output logic signal states.

**2 Fuzzy neural network:**

This subclass is indented under subclass 1. Subject matter comprising interconnected processors that perform the approximate reasoning.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 15+, for neural networks having no fuzzy logic hardware.

**3 Analog fuzzy computer (e.g., controller):**

This subclass is indented under subclass 1. Subject matter wherein the circuit arrangement comprises electrical components that perform arithmetic operations upon electrical signals, which are continuously varying representations of physical quantities or which are some function of quantities.

SEE OR SEARCH CLASS:

- 700, Data Processing: Generic Control Systems or Specific Applications, subclass 50 for adaptive control using fuzzy logic.
- 701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 27 for automatic route guidance using fuzzy logic.
- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 800 through 854 for electric analog computers.

**4 Digital fuzzy computer (e.g., controller):**

This subclass is indented under subclass 1. Subject matter wherein the circuit arrangement comprises electrical components that perform calculation upon discrete electrical signals representing a value normally described by numerical digits.

SEE OR SEARCH CLASS:

- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 100 through 714 for digital calculating computers.

**5 Having function generator:**

This subclass is indented under subclass 1. Subject matter wherein the circuit arrangement contains an electrical device capable of producing one or more functions for fuzzy sets.

SEE OR SEARCH THIS CLASS, SUBCLASS:

Z, for fuzzy logic hardware having a function calculator.

**6 By neural network:**

This subclass is indented under subclass 5. Subject matter wherein the function generator is controlled by a parallel distributed processing processor constructed in hardware or simulated in software.

SEE OR SEARCH THIS CLASS, SUBCLASS:

15+, for neural networks having no fuzzy logic hardware.

**7 Having a function calculator:**

This subclass is indented under subclass 1. Subject matter wherein the circuit arrangement contains at least a function calculator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

5+, for fuzzy logic hardware having a function generator.

**8 Fuzzy inference processing:**

This subclass is indented under subclass 1. Subject matter wherein a conclusion is deduced from a set of rules based on the approximate reasoning.

**9 Defuzzification processing:**

This subclass is indented under subclass 1. Subject matter wherein the circuit arrangement produces a crisp value for a conclusion.

**10 PLURAL PROCESSING SYSTEMS:**

This subclass is indented under the class definition. Subject matter comprising (1) computers that emulate intelligence connected in parallel or distributed arrangement, or (2) a compound system having as least one significant artificial intelligence system.

(1) Note. This subclass includes (1) distributed intelligent agent architectures and cooperative distributed problem solving systems, (2) plural reasoning methods, i.e., intelligent hybrid processing systems, and (3) multi-tasking intelligent processing systems.

SEE OR SEARCH THIS CLASS, SUBCLASS:

15+, for neural network having no fuzzy logic hardware.

SEE OR SEARCH CLASS:

712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclasses 1 through 43 for processing architecture.

**11 HAVING PARTICULAR USER INTERFACE:**

This subclass is indented under the class definition. Subject matter wherein presentation of data to a computer operator of a system contains components that enable interaction by (1) nonverbal representations or symbols or (2) statements in standard English syntax

(1) Note. This subclass includes intelligent processing systems having a hypertext/hypermedia component, a s:graphical user interface component, a natural language component, or a speech interface component.

(2) Note. This subclass includes interface agent systems, personal assistant systems, and intelligent help systems.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61, for modification of knowledge processing system using a tool.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 867 for computer operator interface and subclasses 418-475 for computer graphics processing

**12 MACHINE LEARNING:**

This subclass is indented under the class definition. Subject matter wherein a system has the capability to automatically add to its current integrated collection of facts and relationships.

(1) Note. This subclass includes induction, deduction, applications involving learning (i.e., data mining and knowledge discovery) and statistical learning techniques.

SEE OR SEARCH THIS CLASS, SUBCLASS:

14, for adaptive complex information processing system.

16+, for neural network learning task.

25, for neural network learning method

**13 Genetic algorithm and genetic programming system:**

This subclass is indented under subclass 12. Subject matter wherein a system uses a sequence of steps that (1) starts with a group of solutions to a problem, (2) represents each solution as a coded data string, (3) divides and splices a coded data string to create new solutions, and (4) determines fitness of the new solutions.

(1) Note. This subclass includes evolutionary programming (i.e., learn-acquire knowledge, adapt-adjust).

**14 ADAPTIVE SYSTEM:**

This subclass is indented under the class definition. Subject matter wherein (1) a system continually adjusts its own set of rules (e.g., learns by example) or (2) a system that evolves in any way into a system which continually adjusts its own set of rules.

(1) Note. This subclass includes tuning membership functions and neural networks that continue to learn after they have been trained (i.e., relearning).

**15 NEURAL NETWORK:**

This subclass is indented under the class definition. Subject matter including a system which comprises a parallel process performed by a distributed architecture that learns to recognize and classify input data and is (1) constructed in hardware, (2) emulated in software, or (3) a combination of hardware construction and emulation software.

SEE OR SEARCH THIS CLASS, SUBCLASS:

2, for fuzzy neural network

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, subclass 48 for a neural network used in a control system.

704, Data Processing: Speech Signal Processing, Linguistics, Language Translation and Audio Compression/Decompression, subclasses 202+ for neural network in speech signal processing storage, subclasses 232+ for neural network in speech signal processing recognition and subclasses 259+ for neural network in speech signal processing synthesis.

**16 Learning task:**

This subclass is indented under subclass 15. Subject matter wherein the system is trained to accomplish a specific application.

SEE OR SEARCH THIS CLASS, SUBCLASS:

12, for machine learning.

**17 Approximation:**

This subclass is indented under subclass 16. Subject matter wherein the system estimates a solution to a function from input data.

(1) Note. This subclass includes transformation and function approximation.

**18 Association:**

This subclass is indented under subclass 16. Subject matter wherein the system learns to identify stored patterns similar to input patterns.

SEE OR SEARCH THIS CLASS, SUBCLASS:

20, for neural network having learning task classification or recognition.

**19 Constraint optimization problem solving:**

This subclass is indented under subclass 16. Subject matter wherein the system finds a best solution from specific input data.



**20   Classification recognition:**

This subclass is indented under subclass 16. Subject matter wherein the system learns to categorize or identify input data.

SEE OR SEARCH THIS CLASS, SUBCLASS:

18,        for neural network having learning task association.

**21   Prediction:**

This subclass is indented under subclass 16. Subject matter wherein the system learns to forecast future patterns from input patterns.

**22   Signal processing (e.g., filter):**

This subclass is indented under subclass 16. Subject matter wherein the system intentionally changes characteristics of a conveyer of information.

**23   Control:**

This subclass is indented under subclass 16. Subject matter wherein the system models, monitors, or regulates a physical system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

903+,    for cross reference art collection of an artificial intelligence system having details of control.

SEE OR SEARCH CLASS:

700,    Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for generic data processing control systems, per se.

**24   Beamforming(e.g., target location, radar):**

This subclass is indented under subclass 16. Subject matter wherein the system decides correct direction for a collection of parallel rays.

SEE OR SEARCH CLASS:

250,    Radiant Energy, various subclasses for methods and apparatus involving radiant energy.

342,    Communication: Directive Radio Wave and Devices (e.g. Radar, Radio Navigation), various subclasses for transmission or reception of radio wave energy for obtaining or utilizing information.

359,    Optics: System (Including Communication) and Elements, various subclasses for optical elements and optical systems not elsewhere classified.

**25   Learning method:**

This subclass is indented under subclass 15. Subject matter wherein the system acquires its internal set of rules.

SEE OR SEARCH THIS CLASS, SUBCLASS:

12,        for machine learning.

**26 Structure:**

This subclass is indented under subclass 15. Subject matter wherein the system contains construction details of processors or their interconnections.

SEE OR SEARCH CLASS:

326, Electronic Digital Logic Circuitry, subclasses 36+ for threshold (e.g., majority) digital logic which may be utilizable for neural networks.

**27 Architecture:**

This subclass is indented under subclass 26. Subject matter wherein the structure (1) are organized for a specific network topology or (2) use neural processors to perform specific transform functions.

SEE OR SEARCH CLASS:

712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclasses 1 through 43 for processing architecture, in general.

**28 Modular:**

This subclass is indented under subclass 27. Subject matter wherein the architecture comprises a plurality of identical modules of neural networks.

**29 Lattice:**

This subclass is indented under subclass 27. Subject matter wherein the architecture comprises a plurality of locally interconnected neuron processors.

**30 Recurrent:**

This subclass is indented under subclass 27. Subject matter wherein the architecture comprises feedback interconnections.

**31 Multilayer feedforward:**

This subclass is indented under subclass 27. Subject matter wherein the architecture comprises two or more groups of neural processors, where at least one group of neural processors bypasses a group of neural processors.

**32 Single-layer:**

This subclass is indented under subclass 27. Subject matter wherein the architecture comprises one group of processors.

**33 Semiconductor neural network:**

This subclass is indented under subclass 26. Subject matter wherein the structure contains a solid or liquid electronic conductor in which an electrical charge carrier concentration increases with increasing temperature over a temperature range.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), various subclasses for semiconductor devices, per se.

**34 Hybrid network (i.e., analog and digital):**

This subclass is indented under subclass 26. Subject matter wherein the structure contains analog and digital components.

**35 Using pulse modulation:**

Subject matter undersubclass 34 wherein the hybrid network uses an electrical voltage having a definite rise and decay that varies in amplitude, frequency or phase.

SEE OR SEARCH CLASS:

332, Modulators, subclasses 106+ for pulse modulators, per se.

**36 Having multiplying digital-to-analog converter:**

This subclass is indented under subclass 34. Subject matter wherein the hybrid network contains a device that (1) outputs a product of a magnitude represented by two or more input signals and (2) changes pulse(bit) signals to continuous signals.

SEE OR SEARCH CLASS:

341, Coded Data Generation or Conversion, subclasses 126+ for analog to or from digital conversion, per se.

**37 Having digital weight:**

This subclass is indented under subclass 34. Subject matter wherein the hybrid network comprises interconnections of bits (maintained in a binary memory) that represent a numerical value as a function of bit position code word.

**38 Analog neural network:**

This subclass is indented under subclass 26. Subject matter wherein the structure comprises representations of numerical quantities by means of physical variables.

**39 Modifiable weight:**

This subclass is indented under subclass 38. Subject matter wherein the analog neural network comprises programmable or adjustable interconnections.

**40 Radiant energy neural network:**

This subclass is indented under subclass 26. Subject matter wherein the structure contains at least a source or detector of radiant wave energy.

(1) Note. This subclass includes optical neural networks.

SEE OR SEARCH CLASS:

359, Optics: Systems (Including Communication) and Elements, subclasses 107+ for optical computing, per se.

382, Image Analysis, various subclasses for subject matter wherein an image is detected and significant analysis of an image is performed.

**41 Digital neural network:**

This subclass is indented under subclass 26. Subject matter wherein the structure contains a processing component that can assume only two values.

**42 Parallel connection:**

This subclass is indented under subclass 41. Subject matter comprising an interface in which all bits of data in a given byte are transferred simultaneously, using separate data lines for each bit.

**43 Digital neuron processor:**

This subclass is indented under subclass 41. Subject matter wherein a node of the system comprises logic circuitry that assumes binary values.

**44 Neural simulation environment:**

This subclass is indented under subclass 15. Subject matter comprising an apparatus (or method) for developing substitution or testing of actual operational conditions of the system using a general purpose digital computer.

(1) Note. This subclass includes neural network shells and tools.

SEE OR SEARCH THIS CLASS, SUBCLASS:

60, for knowledge processing tools.

SEE OR SEARCH CLASS:

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, appropriate subclasses.

717, Data Processing: Software Development, Installation, and Management, subclasses 100 through 167 for software program development tools.

**45 KNOWLEDGE PROCESSING SYSTEM:**

This subclass is indented under the class definition. Subject matter wherein a system comprises specific domain data that (1) is integrated as a collection of facts and relationships (i.e., knowledge representation) and (2) applies a reasoning technique.

(1) Note. This subclass and subclasses indented hereunder provide for details of (1) expert systems or (2) operation of expert systems (either stand alone expert systems or expert systems interacting with other systems).

(2) Note. This subclass and subclasses indented hereunder provide for creation and maintenance of expert systems.

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, subclass 49 for a knowledge processing (e.g., an expert system) adaptive control.

**46 Knowledge representation and reasoning technique:**

This subclass is indented under subclass 45. Subject matter wherein a process or system uses a specific (1) method or system for processing the integrated collection of facts and relationships, (2) inferencing method or system, (3) method or system for interconnecting parts of an expert system, (4) internal or external structured data accessing method or system, or (5) method or system for searching the integrated collection of facts and relationships.

**47 Rule-based reasoning system:**

This subclass is indented under subclass 46. Subject matter comprising an inferencing method or system using logic processing that (1) starts with a set of known facts and applies rules to the facts until no new facts are generated (i.e., forward chaining), or (2) starts with a goal, finds rules to fit the goal, and checks to determine if known facts fit the rules (i.e., backward chaining).

(1) Note. This subclass includes event-driven rule-based reasoning, hypothetical reasoning and rules having priority ordering.

**48 Having specific pattern matching or control technique:**

This subclass is indented under subclass 47. Subject matter comprising a system that (1) uses a reticular network algorithm of the collection of facts and relationships, (2) uses a hierarchy of collections (i.e., a higher level integrated collection of facts and relationships about a lower level integrated collection of facts and relationships) or (3) resolves conflicts to determine a firing order for rules.

**49 Blackboard system:**

This subclass is indented under subclass 46. Subject matter comprising a specific method or system for interconnecting parts of the knowledge processing system and having a special memory (i.e., blackboard) that allows data from one part of the knowledge processing system to be written so that it can be accessed by other parts of the knowledge processing system.

**50 Having specific management of a knowledge base:**

This subclass is indented under subclass 46. Subject matter comprising a specific data accessing method or system (such as a database management or a lookup table) to access a database containing information of the knowledge processing system (i.e., knowledge base).

(1) Note. This subclass includes storage and retrieval (e.g., KBMS, DBMS, content-addressable memory, table, etc.).

SEE OR SEARCH CLASS:

707, Data Processing: Database and File Management, Data Structures and Document Processing, subclasses 1+ for information processing system database and file management.

**51 Non-monotonic reasoning system:**

This subclass is indented under subclass 46. Subject matter wherein processing of the integrated collection of facts and relationships contains belief revision (tracking dependencies among propositions).

(1) Note. This subclass includes truth maintenance systems.

**52 Reasoning under uncertainty (e.g., fuzzy logic):**

This subclass is indented under subclass 46. Subject matter wherein the integrated collection of facts and relationships contain inexact knowledge.

(1) Note. This subclass provides for confidence factors, fuzzy logic, membership functions, qualitative reasoning, probabilistic logic, or uncertainty factors.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1, for fuzzy logic hardware.
- 900, for cross reference art collection of a data processing system having fuzzy logic processing and no fuzzy logic hardware.

**53 Frame-based reasoning system:**

This subclass is indented under subclass 46. Subject matter wherein the integrated collection of facts and relationships (1) is connected in a hierarchy of levels that allow facts or relationships missing in a lower level to be inherited from a connected higher level, (2) uses a set of slots related to a specific object, each slot storing a feature of the object, (3) uses an outline (i.e., a script) of an episode of a certain type, or (4) uses a name of some item (i.e., an object) in either an object attribute-value triplet or an object-attribute pair.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 54, for knowledge processing system using analogical reasoning.
- 55, for knowledge processing system having a semantic network.

**54 . Analogical reasoning system:**

This subclass is indented under subclass 46. Subject matter wherein the integrated collection of facts and relationships (1) is in an object having a set of attribute value pairs and (2) has retrieval based on a measure or similarity between query and stored objects.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 53, for knowledge processing system using frame-based reasoning.

**55 Semantic network (i.e., conceptual dependency, fact based structure):**

This subclass is indented under subclass 46. Subject matter wherein the integrated collection of facts and relationships formalizes object and values as nodes, and connects the nodes with arcs that indicate relationships between the various nodes.

(1) Note. This subclass includes conceptual graphs and connectionist systems.

**56 Predicate logic or predicate calculus:**

This subclass is indented under subclass 48. Subject matter wherein the integrated collection of facts and relationships uses a complex reasoning system formed with symbols (arguments and predicates).

(1) Note. A notation of predicate logic is either  $xPy$  or  $P(x,y)$

(2) Note. Predicate logic is usually considered an extension of propositional logic.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 57, for knowledge processing system having propositional logic.

**57 Propositional logic:**

This subclass is indented under subclass 46. Subject matter wherein the integrated collection of facts and relationships uses a reasoning system formed with truth values (e.g., X is a metal, if C then D) or logic connectives (e.g., and, or, not).

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, for knowledge processing system having predicate logic or predicate calculus.

**58 Temporal logic:**

This subclass is indented under subclass 46. Subject matter wherein the integrated collection of facts and relationships contain data having a representation for an aspect of time.

**59 Creation or modification:**

This subclass is indented under subclass 45. Subject matter comprising software or hardware for initially developing or altering a knowledge processing system.

(1) Note. This subclass includes knowledge acquisition techniques.

**60 Expert system shell or tool:**

Subject matter under 59 wherein the software for developing a knowledge processing system (1) provides an interface to a knowledge base or a knowledge processing system or (2) contains an inference engine, a user interface, and knowledge acquisition aids, but no knowledge base (i.e., a "tool").

SEE OR SEARCH CLASS:

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 867 for computer operator interface.

**61 Knowledge acquisition by a knowledge processing system:**

This subclass is indented under subclass 59. Subject matter wherein the system automatically adds to its current integrated collection of facts and relationships.

(1) Note. This subclass includes automatic generation of rules or membership functions by a knowledge processing system.

**62 MISCELLANEOUS:**

This subclass is indented under the class definition. Subject matter not provided for in any of the preceding subclasses.

**CROSS-REFERENCE ART COLLECTIONS**

**900 FUZZY LOGIC:**

Subject matter comprising data processing with inexact reasoning implemented using set membership functions.

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, subclass 50 for adaptive control using fuzzy logic.

701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 27 for automatic route guidance using fuzzy logic.

**902 APPLICATION USING AI HAVING DETAIL OF THE AI SYSTEM:**

Subject matter comprising an expert system having a specific area of application.

**903 Control:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides control data.

**904 Manufacturing or machine (e.g., agriculture machinery, machine tool):**

This subclass is indented under subclass 903. Subject matter wherein the application is related to manufacturing or machinery.

**905 Vehicle or aerospace:**

This subclass is indented under subclass 903. Subject matter wherein the application is related to a vehicle or aerospace.

**906 Process plant:**

This subclass is indented under subclass 903. Subject matter wherein the application is related to a process plant.

**907 Power plant:**

This subclass is indented under subclass 906. Subject matter wherein the process plant is a power plant.

**908 Electronic or computer(internal or network) circuit:**

This subclass is indented under subclass 903. Subject matter wherein the application is related to an electronic circuit, or to the internal operation of a computer or its connection in a network.

**909 Communication:**

This subclass is indented under subclass 903. Subject matter wherein the application is related to communication.

**910 Elevator:**

This subclass is indented under subclass 903. Subject matter wherein the application area is related to an elevator.

**911 Nonmedical diagnostics:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides nonmedical diagnostic data.



- 912 Manufacturing r machine (e.g., agriculture machinery, machine to l):**  
This subclass is indented under subclass 911. Subject matter wherein the application is related to manufacturing or machinery).
- 913 Vehicle or aer space:**  
This subclass is indented under subclass 911. Subject matter wherein the application is related to a vehicle or aerospace.
- 914 Process plant:**  
This subclass is indented under subclass 911. Subject matter wherein the application is related to a process plant.
- 915 Power plant:**  
This subclass is indented under subclass 914. Subject matter wherein the process plant is a power plant.
- 916 Electronic or computer (internal or network) circuit:**  
This subclass is indented under subclass 911. Subject matter wherein the application is related to an electronic circuit, or to the internal operation of a computer or its connection in a network.
- 917 Communication:**  
This subclass is indented under subclass 911. Subject matter wherein the application is related to communication.
- 918 Elevator:**  
This subclass is indented under subclass 911. Subject matter wherein the application area is related to an elevator.
- 919 Designing, planning, programming, CAD, CASE:**  
This subclass is indented under subclass 902. Subject matter wherein the expert system provides data related to designing of an object, plan preparation, program preparation, computer aided design (i.e., CAD), or computer aided software engineering (i.e., CASE).
- 920 Simulation:**  
This subclass is indented under subclass 919. Subject matter wherein the expert system provides simulation related data, e.g., three-dimensional computer simulation of a piston of a car on a computer screen.
- 921 Layout (e.g., circuit, construction):**  
This subclass is indented under subclass 919. Subject matter wherein the expert system provides layout related data, e.g. computer circuit layout or building layout.
- 922 Computer program preparation:**  
This subclass is indented under subclass 919. Subject matter wherein the expert system provides computer program preparation related data.
- 923 Construction:**  
This subclass is indented under subclass 919. Subject matter wherein the expert system provides data related to construction industry, e.g., building codes.
- 924 Medical:**  
This subclass is indented under subclass 902. Subject matter wherein the expert system provides medical related data.

**925 Business:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides business related data.

**926 Time management:**

This subclass is indented under subclass 925. Subject matter wherein the data is time management data.

**927 Education or instruction:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides education or instruction data.

**928 Earth science:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides earth related science data.

**929 Geological (e.g., seismology):**

This subclass is indented under subclass 928. Subject matter wherein the expert system provides geology related data.

**930 Environment:**

This subclass is indented under subclass 928. Subject matter wherein the expert system provides environment related data.

**931 Weather:**

This subclass is indented under subclass 930. Subject matter wherein the data is weather data.

**932 Mathematics, science, or engineering:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides mathematics, science or engineering related data.

**933 Law, law enforcement, or government:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides law, law enforcement, or government related data.

**934 Information retrieval or information management:**

This subclass is indented under subclass 902. Subject matter wherein the expert system provides information retrieval or information management related data.

## FOREIGN ART COLLECTIONS

The definitions below correspond to the definitions of the abolished subclasses under Class 395 from which these collections were formed. See the Foreign Art Collections schedule for specific correspondences. [Note: The titles and definitions for indented art collections include all the details of the one(s) that are hierarchically superior.

**FOR 100 ARTIFICIAL INTELLIGENCE:**

Foreign art collections including subject matter wherein the system or method has the capacity to perform one or more of the functions of recognition, speech signal processing, knowledge processing (i.e., propositional logic, reasoning, learning, self-improvement), complex operations of a manipulator (e.g., robot\* control), or inexact reasoning (e.g., fuzzy logic).

**FOR 101 Fuzzy logic hardware:**

Foreign art collections including subject matter wherein the system includes a specific circuit arrangement for performing logic with more than two levels, e.g., nonbinary or analog logic systems.

**FOR 102 Knowledge processing:**

Foreign art collections including subject matter wherein the system or method (1) has the capacity to process knowledge (i.e., data comprised of an integrated collection of facts and relationships), (2) has the capacity to generate its own set of rules (e.g., trainable processors), (3) structurally duplicates the human brain (e.g., neural networks), (4) functionally duplicates a law of nature (e.g., inheritance, evolution, etc.), or (5) has the capacity for solution of problems in these areas.

**FOR 103 Plural processing systems:**

Foreign art collections including subject matter comprising two or more systems, or methods utilizing two or more systems, wherein at least one system is a knowledge processing system.

**FOR 104 Graphical or natural language user interface:**

Foreign art collections including subject matter wherein presentation of data to the user of the system includes nonverbal representations or symbols, or statements in standard English language syntax.

**FOR 105 Genetic algorithms:**

Foreign art collections including subject matter wherein the system uses a sequence of steps that (1) starts with a group of solutions to a problem, (2) represents each solution as a coded data string, (3) divides and splices the coded numerical strings to create new solutions, and (4) determines the fitness of the new solutions.

**FOR 106 Trainable (i.e., adaptive) systems:**

Foreign art collections including subject matter wherein (1) the system creates its own set of rules (i.e., connection weights) (e.g., learns by example) or wherein (2) the data processing method involves in any way a system which creates its own set of such rules.

**FOR 107 Neural networks:**

Foreign art collections including subject matter wherein the system uses parallel distributed processing processors constructed in hardware or simulated in software. 800.01+, (see (1) Note, above).

**FOR 108 Connectionist expert systems:**

Foreign art collections including subject matter wherein the parallel distributed processing processors have been trained to be an expert system, that is, to process data formed by an integrated collection of facts and relationships (i.e., knowledge).

**FOR 109 Training (i.e., programming or learning):**

Foreign art collections including subject matter wherein a specific method or apparatus is used to adjust the rules (i.e., connection weights).

**FOR 110 Structures:**

Foreign art collections including details of the construction of the processing processors or their interconnections.

**FOR 111 Radiant energy type (e.g., optical):**

Foreign art collections including subject matter wherein the structure includes a source or detector of radiant wave energy.

**FOR 112 Sequential process r:**

Foreign art collections including subject matter wherein the structure comprises one or more computers that process software step-by-step.

**FOR 113 Including a digital r binary element:**

Foreign art collections including subject matter wherein the structure includes a processing component that can assume only two values.

**FOR 114 Expert systems:**

Foreign art collections including subject matter comprising a system wherein the data consists of an integrated collection of facts and relationships (i.e., knowledge).

**FOR 115 Deduction, control, or search techniques:**

Foreign art collections including subject matter wherein a process or system uses a specific (1) method or system for processing the integrated collection of facts and relationships, (2) inferencing method or system, (3) method or system for interconnecting parts of the expert system, (4) internal or external structured data accessing method or system, or (5) method or system for searching the integrated collection of facts and relationships.

**FOR 116 Forward or backward chaining:**

Foreign art collections including an inferencing method or system using logic processing that starts with a set of known facts and applies rules to the facts until no new facts are generated or a goal is reached (i.e., forward chaining), or logic processing that starts with a goal and then finds rules to fit the goals and then checks to see if known facts fit the found rules (i.e., backward chaining).

**FOR 117 Blackboarding:**

Foreign art collections including subject matter wherein a specific method or system for interconnecting parts of the expert system uses a special memory (i.e., blackboard) where data from one part of the expert system can be written so that it can be accessed by other parts of the expert system.

**FOR 118 Knowledge base accessing (e.g., DBMS, table):**

Foreign art collections including subject matter wherein a specific data accessing method or system, such as a database management system or a lookup table, is used to access a database containing the knowledge of the expert system (i.e., the knowledge base).

**FOR 119 Truth maintenance systems (TMS):**

Foreign art collections including subject matter wherein the processing of the integrated collection of facts and relationships include belief revision by tracking dependencies among propositions and informing a user as to which propositions can be believed.

**FOR 120 Knowledge representations:**

Foreign art collections including subject matter wherein a process or system uses (1) a specific type of relationship in the integrated collection of facts and relationships, (2) a specific type of integrated collection of facts and relationships, or (3) a specific type of fact in the integrated collection of facts and relationships.

**FOR 121 F r inexact knowledge (e.g., fuzzy l gic):**

Foreign art collections including subject matter wherein the facts or relationships include a weight value other than 1 (e.g., 1/2, .5, 1.5, 60%).

**FOR 122 Objects (i.e., bject-attribute-value), frames and slots, r scripts:**

Foreign art collections including subject matter wherein the specific integrated collection

of facts and relationships uses (1) a set of slots (i.e., a frame) related to a specific object, each slot storing a feature of the object, (2) an outline (i.e., a script) of an episode of a certain type, or (3) the name of some item (i.e., an object) in either an object-attribute-value triplet or an object-attribute pair.

**FOR 123 Semantic network (i.e., conceptual dependency, fact based structure):**

Foreign art collections including subject matter wherein the specific integrated collection of facts and relationships formalizes objects and values as nodes, and connects the nodes with arcs or links that indicate the relationships between the various nodes.

**FOR 124 Rete network or meta-knowledge:**

Foreign art collections including subject matter which (1) uses a reticular network algorithm on the collection of facts and relationships (e.g., is formed of subcollections which are searched in parallel) or (2) includes a hierarchy of collections, i.e., a higher level integrated collection of facts and relationships about a lower level integrated collection of facts and relationships (i.e., knowledge about knowledge).

**FOR 125 Inheritance:**

Foreign art collections including subject matter wherein the specific integrated collection of facts and relationships is connected in a hierarchy of levels which allow facts or relationships missing in a lower level to be taken (i.e., inherited) from a connected higher level where they are present.

**FOR 126 Predicate logic or predicate calculus:**

Foreign art collections including subject matter wherein the specific integrated collection of facts and relationships uses a complex logic system formed with arguments and predicates.

**FOR 127 Propositional logic:**

Foreign art collections including subject matter wherein the specific integrated collection of facts and relationships uses a simple logic formed with truth values (e.g., "X is a metal," "if C then D") or logic connectives (e.g., and, or, not).

**FOR 128 History base:**

Foreign art collections including subject matter wherein the specific integrated collection of facts and relationships include historical data (i.e., data collected over a period of time) about the expert system or about the area of expertise.

**FOR 129 Creation or modification of an expert system:**

Foreign art collections including subject matter comprising means (i.e., software or hardware) for initially developing or altering the expert system.

**FOR 130 Expert system shells or tools:**

Foreign art collections including subject matter wherein the software for developing an expert system (1) contains an inference engine, a user interface, and knowledge acquisition aids, but no knowledge base (i.e., a "tool") or (2) provides an interface to such a tool or an expert system (i.e., a "shell").

**FOR 131 Learning or knowledge acquisition by the expert system:**

Foreign art collections including subject matter wherein the existing expert system has the capability to automatically add to its current integrated collection of facts and relationships.

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*Last Modified: Monday, March 15, 2004 10:53:55*

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## **Class 706 DATA PROCESSING: ARTIFICIAL INTELLIGENCE**

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- 1** **FUZZY LOGIC HARDWARE**
- 2 . Fuzzy neural network
- 3 . Analog fuzzy computer (e.g., controller)
- 4 . Digital fuzzy computer (e.g., controller)
- 5 . Having function generator
- 6 .. By neural network
- 7 . Having function calculator
- 8 . Fuzzy inference processing
- 9 . Defuzzification processing
- 10** **PLURAL PROCESSING SYSTEMS**
- 11** **HAVING PARTICULAR USER INTERFACE**
- 12** **MACHINE LEARNING**
- 13 . Genetic algorithm and genetic programming system
- 14** **ADAPTIVE SYSTEM**
- 15** **NEURAL NETWORK**
- 16 . Learning task
- 17 .. Approximation
- 18 .. Association
- 19 .. Constraint optimization problem solving
- 20 .. Classification or recognition
- 21 .. Prediction
- 22 .. Signal processing (e.g., filter)
- 23 .. Control
- 24 .. Beamforming (e.g., target location, radar)
- 25 . Learning method
- 26 . Structure
- 27 .. Architecture
- 28 ... Modular
- 29 ... Lattice
- 30 ... Recurrent
- 31 ... Multilayer feedforward
- 32 ... Single-layer
- 33 .. Semiconductor neural network
- 34 .. Hybrid network (i.e., analog and digital)
- 35 ... Using pulse modulation
- 36 ... Having multiplying digital-to-analog converter
- 37 ... Having digital weight
- 38 .. Analog neural network
- 39 ... Modifiable weight
- 40 .. Radiant energy neural network
- 41 .. Digital neural network
- 42 ... Parallel connection
- 43 ... Digital neuron processor
- 44 . Neural simulation environment
- 45** **KNOWLEDGE PROCESSING SYSTEM**
- 46 . Knowledge representation and reasoning technique

<u>47</u>	.. Ruled-based reasoning system
<u>48</u>	... Having specific pattern matching or control technique
<u>49</u>	.. Blackboard system
<u>50</u>	.. Having specific management of a knowledge base
<u>51</u>	.. Non-monotonic reasoning system
<u>52</u>	.. Reasoning under uncertainty (e.g., fuzzy logic)
<u>53</u>	.. Frame-based reasoning system
<u>54</u>	.. Analogical reasoning system
<u>55</u>	.. Semantic network (e.g., conceptual dependency, fact based structure)
<u>56</u>	.. Predicate logic or predicate calculus
<u>57</u>	.. Propositional logic
<u>58</u>	.. Temporal logic
<u>59</u>	. Creation or modification
<u>60</u>	.. Expert system shell or tool
<u>61</u>	.. Knowledge acquisition by a knowledge processing system
<u>62</u>	<b>MISCELLANEOUS</b>

## CROSS-REFERENCE ART COLLECTIONS

<u>900</u>	<b>FUZZY LOGIC</b>
<u>902</u>	<b>APPLICATION USING AI WITH DETAIL OF THE AI SYSTEM</b>
<u>903</u>	. Control
<u>904</u>	.. Manufacturing or machine (e.g., agricultural machinery, machine tool)
<u>905</u>	.. Vehicle or aerospace
<u>906</u>	.. Process plant
<u>907</u>	... Power plant
<u>908</u>	.. Electronic or computer (internal or network) circuit
<u>909</u>	.. Communication
<u>910</u>	.. Elevator
<u>911</u>	. Nonmedical diagnostics
<u>912</u>	.. Manufacturing or machine (e.g., agricultural machinery, machine tool)
<u>913</u>	.. Vehicle or aerospace
<u>914</u>	.. Process plant
<u>915</u>	... Power plant
<u>916</u>	.. Electronic or computer (internal or network) circuit
<u>917</u>	.. Communication
<u>918</u>	.. Elevator
<u>919</u>	. Designing, planning, programming, CAD, CASE
<u>920</u>	.. Simulation
<u>921</u>	.. Layout (e.g., circuit, construction)
<u>922</u>	.. Computer program preparation
<u>923</u>	.. Construction
<u>924</u>	. Medical
<u>925</u>	. Business
<u>926</u>	.. Time management
<u>927</u>	. Education or instruction
<u>928</u>	. Earth science
<u>929</u>	.. Geological (e.g., seismology)
<u>930</u>	.. Environment
<u>931</u>	... Weather
<u>932</u>	. Mathematics, science, or engineering
<u>933</u>	. Law, law enforcement, or government
<u>934</u>	. Information retrieval or information management

## FOREIGN ART COLLECTIONS



**FOR000 CLASS-RELATED FOREIGN DOCUMENTS**

Any foreign patents or non-patent literature from subclasses that have been reclassified have been transferred directly to FOR Collections listed below. These Collections contain ONLY foreign patents or non-patent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

**FOR100 ARTIFICIAL INTELLIGENCE (395/1)**

FOR101 . Fuzzy logic hardware (395/3)

FOR102 . Knowledge processing (395/10)

FOR103 .. Plural processing systems (395/11)

FOR104 .. Graphical or natural language user interface (395/12)

FOR105 .. Genetic algorithm (395/13)

FOR106 .. Trainable (i.e., adaptive) system (395/20)

FOR107 ... Neural network (395/21)

FOR108 .... Connectionist expert system (395/22)

FOR109 .... Training (i.e., programming or learning) (395/23)

FOR110 .... Structure (395/24)

FOR111 ..... Radiant energy type (e.g., optical) (395/25)

FOR112 ..... Sequential processor (395/26)

FOR113 ..... Including a digital or binary element (395/27)

FOR114 .. Expert system (395/50)

FOR115 ... Deduction, control, or search techniques (395/51)

FOR116 .... Forward or backward chaining (395/52)

FOR117 .... Blackboarding (395/53)

FOR118 .... Knowledge base accessing (e.g., DBMS, table) (395/54)

FOR119 .... Truth maintenance system (TMS) (395/55)

FOR120 ... Knowledge representation (395/60)

FOR121 .... For inexact knowledge (e.g., fuzzy logic) (395/61)

FOR122 .... Object (i.e., object-attribute-value), frame and slot, or script (395/62)

FOR123 .... Semantic network (i.e., conceptual dependency, fact based structure) (395/63)

FOR124 .... Rete network or meta-knowledge (395/64)

<u>FOR125</u>	.... Inheritance (395/65)
<u>FOR126</u>	.... Predicate logic or predicate calculus (395/66)
<u>FOR127</u>	.... Propositional logic (395/67)
<u>FOR128</u>	.... History base (395/68)
<u>FOR129</u>	... Creation or modification of an expert system (395/75)
<u>FOR130</u>	.... Expert system shell or tool (395/76)
<u>FOR131</u>	.... Learning or knowledge acquisition by the expert system (395/77)


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## **Class 707 DATA PROCESSING: DATABASE AND FILE MANAGEMENT OR DATA STRUCTURES**

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- 1 DATABASE OR FILE ACCESSING**
- 2 . Access augmentation or optimizing
- 3 . Query processing (i.e., searching)
- 4 .. Query formulation, input preparation, or translation
- 5 .. Query augmenting and refining (e.g., inexact access)
- 6 .. Pattern matching access
- 7 . Sorting
- 8 . Concurrency (e.g., lock management in shared database)
- 9 . Privileged access
- 10 . Distributed or remote access
- 100 DATABASE SCHEMA OR DATA STRUCTURE**
- 101 . Manipulating data structure (e.g., compression, compaction, compilation)
- 102 . Generating database or data structure (e.g., via user interface)
- 103R . Object-oriented database structure
- 103Y .. Object-oriented database structure processing
- 103X .. Object-oriented database structure network
- 103Z .. Object-oriented database structure reference
- 104.1 . Application of database or data structure (e.g., distributed, multimedia, image)
- 200 FILE OR DATABASE MAINTENANCE**
- 201 . Coherency (e.g., same view to multiple users)
- 202 .. Recoverability
- 203 .. Version management
- 204 .. Archiving or backup
- 205 . File allocation
- 206 .. Garbage collection

### **FOREIGN ART COLLECTIONS**

#### **FOR000 CLASS-RELATED FOREIGN DOCUMENTS**

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## **Class 704 DATA PROCESSING: SPEECH SIGNAL PROCESSING, LINGUISTICS, LANGUAGE TRANSLATION, AND AUDIO COMPRESSION/DECOMPRESSION**

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- 1** **LINGUISTICS**
- 2 . Translation machine
- 3 .. Having particular Input/Output device
- 4 .. Based on phrase, clause, or idiom
- 5 .. For partial translation
- 6 .. Punctuation
- 7 .. Storage or retrieval of data
- 8 . Multilingual or national language support
- 9 . Natural language
- 10 . Dictionary building, modification, or prioritization
- 200** **SPEECH SIGNAL PROCESSING**
- 200.1 . Psychoacoustic
- 201 . For storage or transmission
- 202 .. Neural network
- 203 .. Transformation
- 204 ... Orthogonal functions
- 205 .. Frequency
- 206 ... Specialized information
- 207 .... Pitch
- 208 ..... Voiced or unvoiced
- 209 .... Formant
- 210 .... Silence decision
- 211 .. Time
- 212 ... Pulse code modulation (PCM)
- 213 ... Zero crossing
- 214 ... Voiced or unvoiced
- 215 ... Silence decision
- 216 ... Correlation function
- 217 .... Autocorrelation
- 218 .... Cross-correlation
- 219 .. Linear prediction
- 220 .. Analysis by synthesis
- 221 .. Pattern matching vocoders
- 222 ... Vector quantization
- 223 ... Excitation patterns
- 224 .. Normalizing
- 225 .. Gain control
- 226 .. Noise
- 227 ... Pretransmission
- 228 ... Post-transmission
- 229 .. Adaptive bit allocation
- 230 .. Quantization
- 231 . Recognition

<u>232</u>	.. Neural network
<u>233</u>	.. Detect speech in noise
<u>234</u>	.. Normalizing
<u>235</u>	.. Speech to image
<u>236</u>	.. Specialized equations or comparisons
<u>237</u>	... Correlation
<u>238</u>	... Distance
<u>239</u>	... Similarity
<u>240</u>	... Probability
<u>241</u>	... Dynamic time warping
<u>242</u>	... Viterbi trellis
<u>243</u>	.. Creating patterns for matching
<u>244</u>	... Update patterns
<u>245</u>	... Clustering
<u>246</u>	.. Voice recognition
<u>247</u>	... Preliminary matching
<u>248</u>	... Endpoint detection
<u>249</u>	... Subportions
<u>250</u>	... Specialized models
<u>251</u>	.. Word recognition
<u>252</u>	... Preliminary matching
<u>253</u>	... Endpoint detection
<u>254</u>	... Subportions
<u>255</u>	... Specialized models
<u>256</u>	.... Markov
<u>257</u>	.... Natural language
<u>258</u>	. Synthesis
<u>259</u>	.. Neural network
<u>260</u>	.. Image to speech
<u>261</u>	.. Vocal tract model
<u>262</u>	.. Linear prediction
<u>263</u>	.. Correlation
<u>264</u>	.. Excitation
<u>265</u>	.. Interpolation
<u>266</u>	.. Specialized model
<u>267</u>	.. Time element
<u>268</u>	.. Frequency element
<u>269</u>	.. Transformation
<u>270</u>	. Application
<u>270.1</u>	.. Speech assisted network
<u>271</u>	.. Handicap aid
<u>272</u>	.. Novelty item
<u>273</u>	.. Security system
<u>274</u>	.. Warning/alarm system
<u>275</u>	.. Speech controlled system
<u>276</u>	.. Pattern display
<u>277</u>	.. Translation
<u>278</u>	.. Sound editing
<b><u>500</u></b>	<b>AUDIO SIGNAL BANDWIDTH COMPRESSION OR EXPANSION</b>
<u>501</u>	. With content reduction encoding
<u>502</u>	. Delay line
<b><u>503</u></b>	<b>AUDIO SIGNAL TIME COMPRESSION OR EXPANSION (E.G., RUN LENGTH CODING)</b>
<u>504</u>	. With content reduction encoding

## FOREIGN ART COLLECTIONS

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☐ 1. Document ID: US 20030234239 A1

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File: PGPB

Dec 25, 2003

PGPUB-DOCUMENT-NUMBER: 20030234239

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030234239 A1

TITLE: Method and system for assessing quality of spot welds

PUBLICATION-DATE: December 25, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
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US-CL-CURRENT: 219/109

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMIC	Draw. De
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☐ 2. Document ID: US 20030082623 A1

L2: Entry 2 of 7

File: PGPB

May 1, 2003

PGPUB-DOCUMENT-NUMBER: 20030082623

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030082623 A1

TITLE: DNA encoding a human melanin concentrating hormone receptor (MCH1) and uses thereof

PUBLICATION-DATE: May 1, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
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Ogozalek, Kristine                      Rochelle Park                      NJ                      US

US-CL-CURRENT: 435/7.1; 435/320.1, 435/325, 435/69.1, 530/350, 536/23.5, 800/8

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 3. Document ID: US 20030077701 A1

L2: Entry 3 of 7

File: PGPB

Apr 24, 2003

PGPUB-DOCUMENT-NUMBER: 20030077701

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030077701 A1

TITLE: DNA encoding a human melanin concentrating hormone receptor (MCH1) and uses thereof

PUBLICATION-DATE: April 24, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
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Laz, Thomas M.	Parlin	NJ	US	
Nagorny, Raisa	Fairlawn	NY	US	
Wilson, Amy E.	Woodstock	NY	US	

US-CL-CURRENT: 435/69.1; 435/320.1, 435/325, 530/350, 536/23.5

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 4. Document ID: US 20020184169 A1

L2: Entry 4 of 7

File: PGPB

Dec 5, 2002

PGPUB-DOCUMENT-NUMBER: 20020184169

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020184169 A1

TITLE: Method and device for creating a sequence of hypotheses

PUBLICATION-DATE: December 5, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Opitz, David William	Missoula	MT	US	

US-CL-CURRENT: 706/20; 706/16

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 5. Document ID: US 20020016681 A1

L2: Entry 5 of 7

File: PGPB

Feb 7, 2002

PGPUB-DOCUMENT-NUMBER: 20020016681

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020016681 A1

TITLE: Single point interaction screen to predict IC50

PUBLICATION-DATE: February 7, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Ekins, Sean	Indianapolis	IN	US	
Gao, Feng	Old Lyme	CT	US	
Johnson, Diane L.	Waterford	CT	US	
Kelly, Kevin G.	Gales Ferry	CT	US	
Meyer, Ralph D.	East Lyme	CT	US	

US-CL-CURRENT: 702/19

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. De
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☐ 6. Document ID: US 6317731 B1

L2: Entry 6 of 7

File: USPT

Nov 13, 2001

US-PAT-NO: 6317731

DOCUMENT-IDENTIFIER: US 6317731 B1

TITLE: Method for predicting the therapeutic outcome of a treatment

DATE-ISSUED: November 13, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Luciano; Joanne Sylvia	Belmont	MA	02478	

US-CL-CURRENT: 706/21; 706/15, 706/52

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. De
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☐ 7. Document ID: US 6063028 A

L2: Entry 7 of 7

File: USPT

May 16, 2000

US-PAT-NO: 6063028

DOCUMENT-IDENTIFIER: US 6063028 A

TITLE: Automated treatment selection method

DATE-ISSUED: May 16, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Luciano; Joanne Sylvia	Cambridge	MA	02139-4057	

US-CL-CURRENT: 600/300; 128/898, 434/236

Full	Title	Citation	Front	Review	Classification	Date	Reference	Generate	Print	Claims	KMIC	Draw D
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☐ 1. Document ID: US 20030222977 A1

Using default format because multiple data bases are involved.

L3: Entry 1 of 9

File: PGPB

Dec 4, 2003

PGPUB-DOCUMENT-NUMBER: 20030222977

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030222977 A1

TITLE: Intelligent system and 3D virtual object generator

PUBLICATION-DATE: December 4, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Yoshino, Kazutora	Madison	WI	US	

US-CL-CURRENT: [348/51](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw De
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☐ 2. Document ID: US 20020184169 A1

L3: Entry 2 of 9

File: PGPB

Dec 5, 2002

PGPUB-DOCUMENT-NUMBER: 20020184169

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020184169 A1

TITLE: Method and device for creating a sequence of hypotheses

PUBLICATION-DATE: December 5, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Opitz, David William	Missoula	MT	US	

US-CL-CURRENT: [706/20](#); [706/16](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw De
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☐ 3. Document ID: US 20020042793 A1

L3: Entry 3 of 9

File: PGPB

Apr 11, 2002

PGPUB-DOCUMENT-NUMBER: 20020042793  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020042793 A1

TITLE: Method of order-ranking document clusters using entropy data and bayesian  
self-organizing feature maps

PUBLICATION-DATE: April 11, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Choi, Jun-Hyeog	Incheon-si		KR	

US-CL-CURRENT: 707/6; 707/3

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	RWC	Draw. De
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☐ 4. Document ID: US 6618717 B1

L3: Entry 4 of 9

File: USPT

Sep 9, 2003

US-PAT-NO: 6618717  
DOCUMENT-IDENTIFIER: US 6618717 B1  
**\*\* See image for Certificate of Correction \*\***

TITLE: Computer method and apparatus for determining content owner of a website

DATE-ISSUED: September 9, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Karadimitriou; Kosmas	Shrewsbury	MA		
Stern; Jonathan	Newton	MA		
Decary; Michel	Quebec			CA
Rothman-Shore; Jeremy W.	Cambridge	MA		

US-CL-CURRENT: 706/61; 706/46, 706/59

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	RWC	Draw. De
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☐ 5. Document ID: US 6502082 B1

L3: Entry 5 of 9

File: USPT

Dec 31, 2002

US-PAT-NO: 6502082  
DOCUMENT-IDENTIFIER: US 6502082 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Modality fusion for object tracking with training system and method

DATE-ISSUED: December 31, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Toyama; Kentaro	Redmond	WA	98052	
Horvitz; Eric J.	Kirkland	WA	98033	

US-CL-CURRENT: 706/16; 706/15, 706/20

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KIMC	Drawings
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☐ 6. Document ID: US 6499025 B1

L3: Entry 6 of 9

File: USPT

Dec 24, 2002

US-PAT-NO: 6499025

DOCUMENT-IDENTIFIER: US 6499025 B1

TITLE: System and method for tracking objects by fusing results of multiple sensing modalities

DATE-ISSUED: December 24, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Horvitz; Eric J.	Kirkland	WA		
Toyama; Kentaro	Redmond	WA		

US-CL-CURRENT: 706/52; 342/64, 700/90

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KIMC	Drawings
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☐ 7. Document ID: US 6480194 B1

L3: Entry 7 of 9

File: USPT

Nov 12, 2002

US-PAT-NO: 6480194

DOCUMENT-IDENTIFIER: US 6480194 B1

TITLE: Computer-related method, system, and program product for controlling data visualization in external dimension(s)

DATE-ISSUED: November 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
------	------	-------	----------	---------

Sang'udi; Gerald P.	Sunnyvale	CA
Bott; Ross A.	Half Moon Bay	CA
Tesler; Joel D.	Cupertino	CA
Hawkes; John R.	Mercer Island	WA
Xiong; Rebecca W.	Cambridge	MA
Schkolnick; Mario	Mountain View	CA

US-CL-CURRENT: 345/440; 345/473

Full	Title	Citation	Front	Review	Classification	Date	Reference	<del>Sequences</del>	<del>Attachments</del>	Claims	RWC	Draw D
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☐ 8. Document ID: US 6345265 B1

L3: Entry 8 of 9

File: USPT

Feb 5, 2002

US-PAT-NO: 6345265

DOCUMENT-IDENTIFIER: US 6345265 B1

TITLE: Clustering with mixtures of bayesian networks

DATE-ISSUED: February 5, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Thiesson; Bo	Kirkland	WA	98033	
Meek; Christopher A.	Kirkland	WA	98033	
Chickering; David Maxwell	Redmond	WA	98052	
Heckerman; David Earl	Bellevue	WA	98008	

US-CL-CURRENT: 706/52; 706/45

Full	Title	Citation	Front	Review	Classification	Date	Reference	<del>Sequences</del>	<del>Attachments</del>	Claims	RWC	Draw D
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☐ 9. Document ID: US 6301579 B1

L3: Entry 9 of 9

File: USPT

Oct 9, 2001

US-PAT-NO: 6301579

DOCUMENT-IDENTIFIER: US 6301579 B1

TITLE: Method, system, and computer program product for visualizing a data structure

DATE-ISSUED: October 9, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Becker; Barry G.	Mountain View	CA		

US-CL-CURRENT: 707/102; 345/440, 707/104.1

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	IMC	Draw D
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 EPO Abstracts Database  
 JPO Abstracts Database  
 Derwent World Patents Index  
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L6

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**Hit Count**   **Set Name**  
 result set

*DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=NO; OP=OR*

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## **CLASS 704, DATA PROCESSING: SPEECH SIGNAL PROCESSING, LINGUISTICS, LANGUAGE TRANSLATION, AND AUDIO COMPRESSION/DECOMPRESSION**

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### **SECTION I - CLASS DEFINITION**

This is the generic class for apparatus and corresponding methods for constructing, analyzing, and modifying units of human language by data processing, in which there is a significant change in the data.

This class also provides for systems or methods that process speech signals for storage, transmission, recognition, or synthesis of speech.

This class also provides for systems or methods for bandwidth compression or expansion of an audio signal, or for time compression or expansion of an audio signal.

Class 704 is structured into three main divisions:

- A. Linguistics.
- B. Speech Signal Processing.
- C. Audio Compression.

See Subclass References to the Current Class, below, for the subclasses located within each of these three main divisions.

### **SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

#### **A. LINGUISTICS**

1. This class does not include subject matter wherein significant details of the modification or construction of documents are claimed. (See Class 707 in the Search Class notes below in References to Other Classes, regarding Document Processing).
2. This class does not include subject matter directed to significant details of teaching languages. (See Class 434 in the Search Class notes in References to Other Classes, below).
3. This class does not include subject matter directed to significant details of the construction, analysis or modification of computer languages. (See Class 717 in the Search Class notes in References to Other Classes, below).

#### **B. IMAGE ANALYSIS**

1. This class does not include subject matter wherein significant image analysis is performed and speech signal processing is nominally claimed (see Class 382 in the Search Class notes in References to Other Classes, below).

2. This class includes subject matter directed to speech signal processing disclosed or claimed in plural diverse arts such as image analysis (classified, per se, in Class 382).

#### C. AUDIO SIGNAL PROCESSING

1. This class does not include subject matter wherein nominal bandwidth or time modifications are performed for other audio processing defined in Classes 381 or 84 (see Search Class notes below in References to Other Classes). Examples of subject matter not included are: Stereo, sound effects, hearing aids, input and output transducers, and musical instruments.

2. This class includes audio signal processing wherein significant processing is performed to modify the signal's bandwidth or time characteristics for compression or expansion of the signal.

#### D. COMMUNICATIONS

1. This class does not include subject matter wherein significant details of a distinct communications system or telephone link is performed and speech signal processing is nominally claimed (see Classes 340, 370, 375, 379, 455 in the Search Class notes below in References to Other Classes.).

2. This class includes subject matter directed to speech signal processing disclosed or claimed in plural diverse arts such as various types of communication systems.

#### E. APPLICATIONS

1. This class does not include subject matter wherein significant details of application systems are performed and speech signal processing is nominally claimed.

2. This class includes subject matter directed to speech signal processing disclosed or claimed in plural diverse arts to include electrical and mechanical systems. Examples would include systems controlled by speech recognition, systems which create specific displays of speech data, systems for editing speech data and otherwise unrelated systems which incorporate speech signal processing details such as placing a speech synthesizer into novelty items.

### SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for linguistics.

100+, for speech signal processing.

500+, for audio compression.

### SECTION IV - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

84, Music, subclasses 1+ for instruments used in producing music to include (a) electrical music instruments, (b) automatic instruments, and (c) hand-played instruments. Automatic and hand-played instruments are divided into four groups: stringed, wind, rigid vibrators, and membranes. This class also includes some accessory devices generally recognized as belonging to the art or industry.

- 181, Acoustics, various subclasses, for mechanically transmitting, amplifying and ascertaining the direction of sound and for mechanically muffling or filtering sound.
- 340, Communications: Electrical, subclasses 825+ for controlling one or more devices to obtain a plurality of results by transmission of a designated one of plural distinctive control signals over a smaller number of communication lines or channels.
- 341, Coded Data Generation or Conversion, various subclasses for electrical pulse and digit code converters (e.g., systems for originating or emitting a coded set of discrete signals or translating one code into another code wherein the meaning of the data remains the same but the formats may differ).
- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, various subclasses for the selective control of two or more light generating or light controlling display elements in accordance with a received image signal, and subclasses 1.1 through 3.4 for visual display systems with selective electrical control including display memory organization and structure for storing image data and manipulating image data between a display memory and display device.
- 360, Dynamic Magnetic Information Storage or Retrieval, which is an integral part of Class 369 following subclass 18, for record carriers and systems wherein information is stored and retrieved by interaction with a medium and there is relative motion between a medium and a transducer, for example, magnetic disk drive devices, and control thereof, per se.
- 365, Static Information Storage and Retrieval, various subclasses for addressable static singular storage elements or plural singular storage elements of the same type (i.e., the internal elements of memory, per se).
- 369, Dynamic Information Storage or Retrieval, various subclasses for record carriers and systems wherein information is stored and retrieved by interaction with a medium and there is relative motion between a medium and a transducer.
- 370, Multiplex Communications, for the simultaneous transmission of two or more signals over a common medium, particularly subclasses 58.1+ for time division multiplex (TDM) switching, subclasses 85.1+ for time division bus transmission, and subclasses 91+ for asynchronous TDM communications including addressing.
- 375, Pulse or Digital Communications, various subclasses for generic pulse or digital communication systems and synchronization of clocking signals from input data.
- 377, Electrical Pulse Counters, Pulse Dividers, and Shift Registers: Circuits and Systems, various subclasses for generic circuits for pulse counting.
- 379, Telephonic Communications, various subclasses for two-way electrical communication of intelligible audio information of arbitrary content over a link including an electrical conductor.
- 380, Cryptography, appropriate subclasses for cryptographic electric signal modification.
- 381, Electrical Audio Signal Processing Systems and Devices, various subclasses for wired one-way audio systems, per se.
- 382, Image Analysis, various subclasses for operations performed on image data with the aim of measuring a characteristic of an image, detecting variations, detecting structures, or transforming the image data, and for procedures for analyzing and categorizing patterns present in image data.
- 434, Education and Demonstration, subclasses 112+ for communication aids for the handicapped, subclasses 156+ for education and demonstration of language, subclasses 322+ for question or problem eliciting response.
- 455, Telecommunications, appropriate subclasses for modulated carrier wave communication, per se, and subclass 26.1 for subject matter which blocks access to a signal source or otherwise limits usage of modulated carrier equipment.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for data processing generic control systems, subclasses 90-306 for applications of computers in various environments.
- 702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses for the

application of computer data processing in measuring, calibrating, or testing.

- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 1+ for hybrid computers, subclasses 100+ for calculators, digital signal processing and arithmetical processing, per se, subclasses 300+ for digital filters, and subclasses 800+ for electric analog computers.
- 713, Electrical Computers and Digital Processing Systems: Support, subclass 187 and 188 for software program protection or computer virus detection in combination with data encryption.
- 714, Error Detection/Correction and Fault Detection/Recovery, various subclasses for generic electrical pulse or pulse coded data error detection and correction.
- 715, Data Processing: Presentation Processing of Document, appropriate subclasses for document processing including layout, editing, and spell-checking.
- 717, Data Processing: Software Development, Installation, and Management, appropriate subclasses for significant details of the construction, analysis, or modification of computer languages.

## SECTION V - GLOSSARY

The terms below have been defined for purposes of classification in this class and are shown in underlined type when used in the class and subclass definitions. When these terms are not underlined in the definitions, the meaning is not restricted to the glossary definitions below.

### CORRELATION

A statistical measurement of the interdependence or association between two variables that are quantitative or qualitative in nature. A typical calculation would be performed by multiplying a signal by either another signal (cross-correlation) or by a delayed version of itself (autocorrelation).

### DISTANCE

A statistical measurement for comparing elements defined by variables or vectors using scalar or vector subtraction of those elements. Examples: distance=a-b, |a-b|, (a-b).5 or two vectors may be treated as objects such that the straight line distance is measured between them.

### EXCITATION

Stimulation of the vocal tract by vibratory action of the vocal cords or by a turbulent air flow. In a digital system, the vocal tract is typically modelled with a filter and excitation of the filter is performed using time representations of pitch (voiced excitation) and noise (unvoiced excitation).

### LANGUAGE

A systematic means of communicating ideas or feelings by the use of conventionalized sounds, gestures, or marks having understood meanings.

### LINGUISTICS

The study of human speech including the units, nature, structure, and modification of language.

### Masking

1. The interference with the perception of one sound (the signal) with another sound (the masker).
2. The number of decibels by which a masking sound will raise (or change) a listener's threshold of audibility of other sounds.

### Critical bandwidths

Bandwidths of the hearing process, as measured by the masking effect of a white, random noise in which a person detects a pure tone.

**Bark spectrum**

The width of one critical band.

**Mel**

A subjective measure of pitch based upon a signal of 1000 Hz. being defined as "1000 mels" where a perceived frequency twice as high is defined as 2000 mels and half as high as 500 mels.

**NOISE**

Any sound which is undesirable and interferes with one's hearing or with a system's analysis of desired sound.

**Phon**

The loudness level of any other sound based upon the SPL (sound pressure level measured in decibels) of a 1 kHz tone. For example, if we judge a certain waveform to sound as loud as a 1 kHz tone at 70 dB, then this waveform has a loudness level of 70 phons.

**PITCH**

The measurable frequency or period at which the glottis vibrates.

**SIMILARITY**

A statistical measurement which is inversely proportional to distance. For example, if two patterns are compared yielding a small distance, then the patterns would exhibit a large (or high degree of) similarity.

**Sone**

A measure of loudness as a function of frequency and sound pressure. A pure tone of 1 kHz. at 40 db above a normal listener's threshold produces a loudness of 1 sone.

**SPEECH**

The communication or expression of thoughts in spoken words.

**UNVOICED**

Speech sounds produced by a turbulent flow of air created at some point of stricture in the vocal tract and usually lacking pitch.

**VOICED**

Speech sounds produced by vibratory action of the vocal cords and usually having pitch.

**SUBCLASSES**

**1 LINGUISTICS**

This subclass is indented under the class definition. Subject matter including means or steps for constructing a word, a phrase, or a sentence in a language.

SEE OR SEARCH CLASS:

434, Education and Demonstration, subclasses 156+ for demonstration and education in linguistics.

**2 Translation machine:**

This subclass is indented under subclass 1. Subject matter wherein a language (i.e., source language) stored in a memory means is translated into another language (i.e., target language).

SEE OR SEARCH THIS CLASS, SUBCLASS:

9, for translation machines with significant natural language processing.

SEE OR SEARCH CLASS:

358, Facsimile and Static Presentation Processing, subclass 403 for document filing and retrieval system.

716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, subclass 3 for translation of computer program in designing and analyzing circuits and semiconductor mask.

717, Data Processing: Software Development, Installation, and Management, subclasses 136 through 161 for software program code translator or compiler in software development.

**3 Having particular Input/Output device::**

This subclass is indented under subclass 2. Subject matter wherein the translation machine includes a means for reading into the memory means a language, for pronouncing the translated language or a particular user interface.

(1) Note. Examples of such devices include an optical scanner or voice synthesizer.

**4 Based on phrase, clause, or idiom:**

This subclass is indented under subclass 2. Subject matter wherein the translation machine translates a series of words that form a syntactical unit.

**5 For partial translation:**

This subclass is indented under subclass 2. Subject matter wherein the translation machine includes a means for providing translation for a specified portion of a sentence or a clause.

**6 Punctuation:**

This subclass is indented under subclass 2. Subject matter wherein the translation machine translates a compound word formed by hyphenation or sentences with quotation marks, colons, semicolons, or parentheses.

**7 Storage and retrieval of data:**

This subclass is indented under subclass 2. Subject matter including a means for assigning storage locations or accessing addresses to the memory means.

SEE OR SEARCH CLASS:

707, Data Processing: Database and File Management, Data Structures, and Document Processing, subclasses 1+, for database or file access methods.

**8 Multilingual or national language support:**

This subclass is indented under subclass 1. Subject matter including means or steps to adapt to, process, or support plural languages in systems or in software (i.e., providing language identifiers on files or providing screen prompts in a selected language), or to support the conventions or peculiarities of various national languages (i.e., alphabetical ordering, date or currency indications).

SEE OR SEARCH THIS CLASS, SUBCLASS:

200+, for details of translation between multiple languages.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclass 866 for customization or edition of operator interfaces.

715, Data Processing: Presentation Processing of Document, subclass 536 for composing or editing multiple languages in a document.

**9 Natural language:**

This subclass is indented under subclass 1. Subject matter includes a means for applying grammatical rules or other analyses (e.g., morphemic, syntax, semantic, etc.) to define the true meaning of a sentence or phrase.

(1) Note. When words are undefined in the dictionary of a natural language, the grammatical rules or other analyses are applied in order to determine the true meaning of a sentence or a phrase.

SEE OR SEARCH CLASS:

707, Data Processing: Database and File Management, Data Structures, and Document Processing, subclasses 1+, for nominal natural language processing used in database search and retrieval.



**10 Dictionary building, modification, reorganization:**

This subclass is indented under subclass 1. Subject matter including a construction, a change, or an orderly arrangement of dictionary, thesauri, or the like.

SEE OR SEARCH THIS CLASS, SUBCLASS:

9, for mere use in natural language processing.

200+, for mere use in translation.

SEE OR SEARCH CLASS:

707, Data Processing: Database and File Management or Data Structures, subclass 102 for database details of dictionaries.

715, Data Processing: Presentation Processing of Document, subclass 532 for mere use of a dictionary in editing or composition of a document.

**200 SPEECH SIGNAL PROCESSING:**

This subclass is indented under the class definition. Subject matter wherein the system performs operations or functions on signals which represent speech.

SEE OR SEARCH THIS CLASS, SUBCLASS:

500+, for audio (other than speech) signal bandwidth compression or expansion.

SEE OR SEARCH CLASS:

379, Telephonic Communications, appropriate subclasses for speech signal processing in a telephone system or device.

**200.1 Psych ac ustic**

This subclass is indented under subclass 200. Subject matter wherein an operation on the signal is based upon the masking behavior of the human auditory system.

(1) Note. The calculation of masking thresholds based upon incoming analysis of audio is the basis of psychoacoustic compression because the frequency with the highest local amplitude will tend to mask (make inaudible) nearby frequencies below the threshold.

(2) Note. MPEG (Motion Picture Experts Group) sets international standards such as MPEG 1, level 3 (commonly called MP3) for psychoacoustic coding to achieve audio compression of up to 10:1. Typical coders work on a 16-bit PCM audio signal, which is the typical CD quality standard.

(3) Note. Only white noise in a bandwidth centered about a tone and less than or equal to the critical bandwidth contributes to the masking effect. Critical bands are generally considered a set of filters or channels tuned to different center frequencies having a bandwidth of less than a third of an octave.

(4) Note. A plot of frequency versus pitch in mels is similar in shape to the plot of frequency versus the position of auditory-nerve patches on the basilar membrane. This is evidence that human judgment of pitch is based upon the point of excitation along the basilar membrane in the ear.

SEE OR SEARCH CLASS:

382, Image Analysis, subclass 239 for adaptive coding used in MPEG, JPEG & motion JPEG images.

**201 For storage or transmission:**

This subclass is indented under subclass 200. Subject matter wherein the speech, which may be in coded or reduced formats, is stored or transmitted.

**202 Neural networks:**

This subclass is indented under subclass 201. Subject matter wherein coding is performed using parallel distributed processing elements constructed in hardware or simulated in software.

SEE OR SEARCH THIS CLASS, SUBCLASS:

259, for neural networks which decode a coded speech signal.

**203 Transformations:**

This subclass is indented under subclass 201. Subject matter wherein the speech is encoded using a specific mathematical function (e.g., Fourier, Walsh, cosine/sine transform, etc.).

**204 Orthogonal functions:**

This subclass is indented under subclass 203. Subject matter wherein the function is orthogonal (transformations as applied to vector, matrix, linear and polynomial functions, for example).

**205 Frequency:**

This subclass is indented under subclass 201. Subject matter wherein the speech is represented by frequency.

**206 Specialized information:**

This subclass is indented under subclass 205. Subject matter wherein the frequency data is analyzed to identify specific speech information.

**207 Pitch:**

This subclass is indented under subclass 206. Subject matter wherein the specific speech information represents the predominant frequency of the speech.

**208 Voiced or unvoiced:**

This subclass is indented under subclass 207. Subject matter wherein the specific speech information represents the presence (voiced) or absence (unvoiced) of predominant frequency components.

**209 Formant:**

This subclass is indented under subclass 206. Subject matter wherein the specific speech information represents the frequency values of any of several resonance bands which determine the phonetic quality of a vowel sound.

**210 Silence decision:**

This subclass is indented under subclass 206. Subject matter wherein the specific speech information represent the presence or absence of speech.

**211 Time:**

This subclass is indented under subclass 201. Subject matter wherein the speech signal is represented using time (e.g., time measurements and energy measured over time).

**212 Pulse code modulation (PCM):**

This subclass is indented under subclass 211. Subject matter wherein the signal is sampled over time, and the magnitude of each sample is quantized and converted into a digital signal.

**213 Zero crossing:**

This subclass is indented under subclass 211. Subject matter wherein the zero crossings of the signal are used to measure time or frequency.

**214 Voiced or unvoiced:**

This subclass is indented under subclass 211. Subject matter wherein time measurements are used to determine the presence (voiced) or absence (unvoiced) of predominant frequency components.

**215 Silence decision:**

This subclass is indented under subclass 211. Subject matter wherein time measurements are used to determine the presence or absence of speech (e.g., pauses between words, etc.).

**216 Correlation function:**

This subclass is indented under subclass 211. Subject matter wherein analysis of speech is performed using relationships between time series samples.

**217 Autocorrelation:**

This subclass is indented under subclass 216. Subject matter wherein the relationships are between different speech samples taken from the same time series.

**218 Cross-relationships:**

This subclass is indented under subclass 216. Subject matter wherein the relationships are between speech samples taken from different time series.

**219 Linear prediction:**

This subclass is indented under subclass 201. Subject matter wherein input samples of speech are estimated from past samples of an input sequence.

**220 Analysis by synthesis:**

This subclass is indented under subclass 201. Subject matter wherein the speech signal is coded and corrected by the difference of the decoded coded signal from the original speech signal.

**221 Pattern matching vocoders:**

This subclass is indented under subclass 201. Subject matter wherein speech signals are compared and matching patterns are encoded.

**222 Vector quantization:**

This subclass is indented under subclass 221. Subject matter wherein the encoding maps a sequence of continuous or discrete vectors into a digital sequence.

**223 Excitation patterns:**

This subclass is indented under subclass 221. Subject matter wherein the encoding models speech using representations including the primary frequency period or periods (e.g., pitch excitation, multipulse excitation, etc.).

**224 Normalizing:**

This subclass is indented under subclass 201. Subject matter wherein modifications of the speech signal emphasize or deemphasize certain features (e.g., spectral slope, average power, etc.).

**225 Gain control:**

This subclass is indented under subclass 201. Subject matter wherein the speech is adjusted to maintain an average amplitude.

**226 Noise:**

This subclass is indented under subclass 201. Subject matter wherein the coding reduces the effects of undesired signal components.

**227 Pre-transmission:**

This subclass is indented under subclass 226. Subject matter wherein the coding precedes transmission.

**228 Post-transmission:**

This subclass is indented under subclass 226. Subject matter wherein decoding after transmission minimizes the effects of noise in the transmission path.

**229 Adaptive bit allocation:**

This subclass is indented under subclass 201. Subject matter wherein limited storage or transmission resources are allocated by giving more resources to areas containing more data and giving fewer resources to areas containing less data.

**230 Quantization:**

Subject matter under 201 wherein coded information is mapped into digital words described by binary symbols.

**231 Recognition:**

This subclass is indented under subclass 200. Subject matter wherein speech is separated into discrete components which are distinguished from one another.

**232 Neural networks:**

This subclass is indented under subclass 231. Subject matter using parallel distributed processing elements constructed in hardware or simulated in software.

**233 Detect speech in noise:**

This subclass is indented under subclass 231. Subject matter wherein the discrete components are distinguished from noise.

**234 Normalizing:**

This subclass is indented under subclass 231. Subject matter wherein the discrete components are modified to emphasize or deemphasize certain features (e.g., spectral slope, average power, etc.).

**235 Speech to image:**

This subclass is indented under subclass 231. Subject matter wherein the distinguished discrete components are converted into image output (e.g., text).

**236 Specialized equations or comparisons:**

This subclass is indented under subclass 231. Subject matter wherein the discrete components are distinguished using specific mathematical functions.

**237 Correlation:**

This subclass is indented under subclass 236. Subject matter wherein the specific function measures a correlation between discrete components (e.g., absolute magnitude difference functions (AMDF), autocorrelation, cross-correlation, etc.).

**238 Distance:**

This subclass is indented under subclass 236. Subject matter wherein the specific function measures the difference between discrete components.

**239 Similarity:**

This subclass is indented under subclass 236. Subject matter wherein the specific function measures the similarity between discrete components.

**240 Probability:**

This subclass is indented under subclass 236. Subject matter wherein the specific function uses probability to determine the occurrence of a discrete component.

**241 Dynamic time warping:**

This subclass is indented under subclass 236. Subject matter wherein time components of the discrete components are aligned with reference components (e.g., using dynamic programming).

**242 Viterbi Trellis:**

This subclass is indented under subclass 236. Subject matter wherein discrete components are distinguished by traversing possible paths through a time series.

**243 Creating patterns for matching:**

This subclass is indented under subclass 231. Subject matter including specific methods for registering the discrete components to be used as references.

**244 Update patterns:**

This subclass is indented under subclass 243. Subject matter wherein the references are modified to improve recognition (e.g., learning).

**245 Clustering:**

This subclass is indented under subclass 243. Subject matter wherein similar references are placed or divided into groups (e.g., K-means algorithm, nearest neighbor, etc.).

**246 Voice recognition:**

This subclass is indented under subclass 231. Subject matter wherein different voices are distinguished (e.g., speaker identification or verification).

**247 Preliminary matching:**

This subclass is indented under subclass 246. Subject matter using an initial comparison followed by a more detailed recognition.

**248 Endpoint detection:**

This subclass is indented under subclass 246. Subject matter including the identification of the beginning and ending points of speech sound segments.

**249 Subportions:**

This subclass is indented under subclass 246. Subject matter including separating speech into sound segments (e.g., utterances, words, phonemes, allophones, etc.).

**250 Specialized models:**

This subclass is indented under subclass 246. Subject matter including models which describe the interconnections between speech sound segments.

**251 Word recognition:**

This subclass is indented under subclass 231. Subject matter wherein different words are distinguished (i.e., the meaning of what is spoken).

**252 Preliminary matching:**

This subclass is indented under subclass 251. Subject matter using an initial comparison followed by a more detailed recognition.

**253 Endpoint detection:**

This subclass is indented under subclass 251. Subject matter identifying the beginning and ending points of words.

**254 Subportions:**

This subclass is indented under subclass 251. Subject matter identifying speech sound segments (e.g., phonemes, allophones, etc.).

**255 Specialized models:**

This subclass is indented under subclass 251. Subject matter including models which describe the interconnections between words or subportions of words.

**256 Mark v:**

This subclass is indented under subclass 255. Subject matter wherein the models include states which represent speech sound portions and transitions which represent connections between speech sound portions (e.g., hidden Markov models, heuristic Markov models, etc.).

**257 Natural language:**

This subclass is indented under subclass 255. Subject matter wherein the models include grammatical constraints (e.g., syntax, etc.).

**258 Synthesis:**

This subclass is indented under subclass 200. Subject matter wherein component parts of a speech signal are combined to produce a synthetic speech output.

**259 Neural networks:**

This subclass is indented under subclass 258. Subject matter wherein synthetic speech output is formed using parallel distributed processing elements constructed in hardware or simulated in software.

**260 Image to speech:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are related to image data (e.g., text to speech, etc.).

**261 Vocal tract model:**

This subclass is indented under subclass 258. Subject matter wherein the component parts model a human vocal tract.

**262 Linear prediction:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are represented by coefficients derived from a sequence of past speech samples.

**263 Correlation:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are represented by coefficients derived from relationships between time series speech samples.

**264 Excitation:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are represented by the period of the primary frequency of the speech signal (e.g., pitch excitation, multi-pulse excitation, etc.).

**265 Interpolation:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are combined using estimates of intermediate values (e.g., waveform smoothing).

**266 Specialized model:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are combined or linked together in a defined manner (e.g., Markov models, trees, tries (tables representing trees), graphs, etc.).

**267 Time element:**

This subclass is indented under subclass 258. Subject matter wherein the component parts comprise time based elements (e.g., words, phonemes, allophones, etc.).

**268 Frequency element:**

This subclass is indented under subclass 258. Subject matter wherein the component parts comprise frequency based elements (e.g., pitch variations, inflection, formants, etc.).

**269 Transformation:**

This subclass is indented under subclass 258. Subject matter wherein the component parts are restored to speech using specific mathematical functions (e.g., Fourier, Walsh, Hilbert, Z-transform, cosine/sine transforms, etc.).

**270 Application:**

This subclass is indented under subclass 200. Subject matter intended or designed for a specified use to which the speech signal processing is being applied.

**270.1 Speech assisted network**

This subclass is indented under subclass 270. Subject matter wherein a system that employs speech recognition or synthesis to control or to provide user feedback such that the processing of speech data may occur at various levels within a computer network.

(1) Note. Various levels of processing would include local or remote locations relative to the user in order to make use of available resources. For example, a local terminal might not have the necessary storage or processing power but this can be overcome by accessing resources over a network. Such resources may include the raw processing power necessary for analysis and pattern matching as well as dictionaries having data relevant to large vocabularies and multiple languages.

(2) Note. Nominal recitations of speech or audio in network applications are classified elsewhere.

**SEE OR SEARCH CLASS:**

348, Television, subclasses 13 through 20 for 2-way interactive conferencing.

370, Multiplex Communications, subclasses 229 through 240 for data flow congestion prevention or control, subclasses 260-269 for conferencing and subclass 351 for voice over internet.

375, Pulse or Digital Communications, subclasses 354 and 356 for synchronizing data for streaming over the internet.

707, Data Processing: Database and File Management or Data Structures, subclass 104.1 for distributed databases.

709, Electrical Computers and Digital processing systems: Multiple computer or Process Coordinating, subclasses 227 through 229 for network computer-to-computer connections.

715, Data Processing: Presentation Processing of Document, subclass 513 for HTML, SGML documents.

**271 Handicap aid:**

This subclass is indented under subclass 270. Subject matter for assisting handicapped people (e.g., blind or speech impaired communication and control).

**272 Novelty item:**

This subclass is indented under subclass 270. Subject matter for novelty items (e.g., greeting cards, toys, etc.).

**273 Security system:**

This subclass is indented under subclass 270. Subject matter for providing security (e.g., limited access).



**274 Warning/alarm system:**

This subclass is indented under subclass 270. Subject matter for providing an audible warning or alarm (e.g., multiple sensors, car gauges, etc.).

**275 Speech controlled system:**

This subclass is indented under subclass 270. Subject matter for controlling specific devices through speech or voice commands.

**276 Pattern display:**

This subclass is indented under subclass 270. Subject matter for providing visual output representing speech (e.g., computer displays of speech data).

**277 Translation:**

This subclass is indented under subclass 270. Subject matter for translating one language into another language.

**278 Sound editing:**

This subclass is indented under subclass 270. Subject matter wherein speech is edited using waveform portions or other representations of the sounds to be modified.

**500 AUDIO SIGNAL BANDWIDTH COMPRESSION OR EXPANSION:**

This subclass is indented under the class definition. Subject matter where there is either an expansion or reduction of the bandwidth required for transmission of a sound signal.

(1) Note. This subclass and its indents provide for bandwidth compression or expansion of audio signals other than speech signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:

200+, for expansion or reduction of a speech signal's bandwidth.

503+, for time compression or expansion of audio signals.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclass 14 for amplitude compression and expansion in a long transmission line.

348, Television, subclasses 384.1 through 440.1 for bandwidth reduction of an analog television signal.

358, Facsimile and Static Presentation Processing, subclasses 426.01 through 426.16 for bandwidth reduction of a facsimile signal.

360, Dynamic Magnetic Information Storage or Retrieval, subclasses 8+ for the use of a magnetic recorder to alter the bandwidth of a signal.

369, Dynamic Information Storage or Retrieval, subclass 60.01 for the use of a dynamic storage device to change the bandwidth of a signal.

370, Multiplex Communications, subclass 118 for bandwidth compression in a multiplex system.

375, Pulse or Digital Communications, subclasses 240 through 241 for bandwidth compression or expansion of a pulse or digital signal, particularly subclasses 240.01-240.29 for digital television.

381, Electrical Audio Signal Processing Systems and Devices, subclass 106 for amplitude compression or expansion.

455, Telecommunications, subclass 72 for message signal compression or expansion in an analog signal modulated carrier wave communication system.

**501 With content reduction encoding:**

This subclass is indented under subclass 500. Subject matter combined with means to discard and replace redundant information by a code indicating what has been discarded.

SEE OR SEARCH CLASS:

341, Coded Data Generation or Conversion, subclass 55 for content reduction encoding, per se.

**502 Delay line:**

This subclass is indented under subclass 500. Subject matter having means to cause a time delay of a sound signal.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 138 through 165 for delay lines, per se.

**503 AUDIO SIGNAL TIME COMPRESSION OR EXPANSION (E.G., RUN LENGTH CODING):**

This subclass is indented under the class definition. Subject matter where there is either an expansion or reduction of the time required for transmission of a nonspeech sound signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

211+, for expansion or reduction of the time required for transmission of a speech signal.

500+, for frequency compression or expansion of a nonspeech audio signal.

SEE OR SEARCH CLASS:

358, Facsimile and Static Presentation Processing, subclasses 426.01 through 426.16 for time compression of a facsimile signal.

360, Dynamic Magnetic Information Storage or Retrieval, subclasses 8+ for the use of a magnetic recorder to alter the time duration of a recorded signal.

369, Dynamic Information Storage or Retrieval, subclass 60.01 for the use of a dynamic storage device to alter the time duration of a recorded signal.

370, Multiplex Communications, subclass 109 for time compression or expansion in a time division multiplex system.

381, Electrical Audio Signal Processing Systems and Devices, subclass 106 for amplitude compression or expansion.

455, Telecommunications, subclass 72 for message signal compression or expansion in an analog signal modulated carrier wave communication system.

**504 With content reduction encoding**

This subclass is indented under subclass 503. Subject matter combined with means to discard and replace redundant information by a code indicating what has been discarded.

SEE OR SEARCH CLASS:

341, Coded Data Generation or Conversion, subclass 55 for content reduction encoding, per se.

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## **CLASS 707, DATA PROCESSING: DATABASE AND FILE MANAGEMENT OR DATA STRUCTURES**

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### **SECTION I - CLASS DEFINITION**

This is the generic class for data processing apparatus and corresponding methods for the retrieval of data stored in a database or as computer files.

This class provides for data processing means or steps for organizing and inter-relating data or files (e.g., relational, network, hierarchical, and entity-relationship models).

This class also provides for data processing means or steps for generic data, file and directory upkeep, file naming, and file and database maintenance including integrity consideration, recovery, and versioning.

Class 707 is structured into three main divisions:

- A. Database and file accessing.
- B. Database schema and data structure.
- C. File and database maintenance.

See Subclass References to the Current Class, below, for the location of subclasses within these three main divisions.

### **RELATIONSHIP WITH OTHER CLASSES**

#### **A. Database and File Accessing**

(1) Note. This class area is directed to computerized database and file accessing and retrieval, including hierarchical, bit-mapped and flat indexing, hashing, stapling, containerizing, and other methods. Accessing and control of a memory, per se, is classified elsewhere. See the search class notes in References to Other Classes, below.

(2) Note. The combination of details of database technology with the business data processing is classified in the business art. See search class notes in References to Other Classes, below.

(3) Note. The combination of details of database technology with a nominal recitation of the subject matter of another class is classified herein. Particular fields of use of database technology performing in combination with the basic subject matter of another class to effect some end other than mere information accessing or retrieval, is classified with the subject matter of the other class, unless specifically excluded therefrom. See the search class notes in References to Other Classes, below.

(4) Note. This class area is directed to generic methods and apparatus for accessing and retrieving data housed in either databases or files. The generic steps to access and retrieve an object from an object-oriented database may be properly classified herein; however, objects themselves for an application other than database accessing and retrieving data, such as, for example an operator interface object, an icon object capable of instantiating a process, or a simulation system physical structure object are classified elsewhere. See the search class notes in References to Other Classes, below.

(5) Note. This class area is directed to generic methods and apparatus for accessing and retrieving data housed in either databases or files. The generic steps of accessing and retrieving data or information in a particular computer design ":environment" may be properly classified herein. Examples of such "environments" include, for example, a computer aided design (CAD) and analysis tool "environment", a software development tool "environment", an image processing "environment", a desk-top or other operator interface "environment", etc., may rely on accessing and retrieving information or routines from libraries while working in the "environment". The "environments" themselves are classified elsewhere in the data processing arts. See the search class notes in References to Other Classes, below.

(6) Note. The combination of a database accessing method with a particular operator interface feature may be found in these subclasses. Operator interfaces, per se, are classified elsewhere. See the search class notes in References to Other Classes, below.

## B. Database Schema and Data Structures

(1) Note. Classification herein requires a combination of a data structure and the access or retrieval method, or apparatus for employing or storing the data structure.

## C. File and Database Maintenance

(1) Note. This class area is directed to means and steps for handling of generic files and databases only in computers and digital data processing systems. For the purpose of these definitions a generic file is defined as a named collection of data. File content and database content authoring, generating, producing, and editing in information processing applications art areas, such as, for example, business data processing machine translation, graphics processing, simulation, animation and software development, is classified elsewhere.

(2) Note. This class area is directed to management and maintenance of files and databases in computers and digital data processing systems and accepts subject solutions working within single memories and across multiple memories. Memory accessing and control and memory management, per se, is classified elsewhere.

(3) Note. This class area is directed to management and maintenance of files and databases in computers and digital data processing systems and accepts only nominal recitations to operator interfaces, icons, and other metaphors used in the maintenance of files and databases. File management tools, metaphors, or objects with significant operator interface features are classified elsewhere.

(4) Note. Formatting and file allocation in memory systems, such as direct access storage systems, is generally found in the art area directed to the storage system device.

## SECTION II - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1 through 10 for database and file accessing.
- 100 through 104.1 for database schema and data structure.
- 200 through 206 for file and database maintenance.

### SECTION III - REFERENCES TO OTHER CLASSES

#### SEE OR SEARCH CLASS:

- 235, Registers, various subclasses for basic machines and associated indicating mechanisms for ascertaining the number of movements of various devices and machines, plus machines made from these basic machines alone (e.g., cash registers, voting machines), and in combination with various perfecting features, such as printers and recording means. In addition, search Class 235 for various data bearing record controlled systems.
- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 867 for operator interfaces, subclasses 418-475 for computer graphics processing, subclasses 1.1-111 for visual display systems with selective electrical control including display memory organization and structure for storing image data and manipulating image data between a display memory and display device.
- 358, Facsimile and Static Presentation Processing, appropriate subclasses for transmitting, processing, or reproducing a permanent picture.
- 379, Telephonic Communications, various subclasses for two-way electrical communication of intelligible audio information of arbitrary content over a link including an electrical conductor.
- 381, Electrical Audio Signal Processing Systems and Devices, various subclasses for wired one-way audio systems, per se.
- 382, Image Analysis, various subclasses for operations performed on image data with the aim of measuring a characteristic of an image, detecting variations, detecting structures, or transforming the image data, and for procedures for analyzing and categorizing patterns present in image data.
- 600, Surgery, subclasses 300 through 595 for diagnostic testing applications of computers in the life sciences including patient monitoring and medical imaging.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for data processing generic control systems, and subclasses 90-306 for applications of computers in various environments.
- 702, Data Processing, Measuring, Calibrating, or Testing, appropriate subclasses for the application of computers in measuring and testing.
- 703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclasses 3 through 22 for data processing simulation.
- 704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 1 through 10 for linguistics.
- 705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, appropriate subclasses for business data processing.
- 706, Data Processing: Artificial Intelligence, appropriate subclasses for artificial intelligence in general.
- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 1 through 9 for hybrid computers, subclasses 100 through 714 for calculators, digital signal processing and arithmetical processing, per se, and subclasses 800 through 854 for electric analog computers.
- 711, Electrical Computers and Digital Processing Systems: Memory, subclasses 1 through 6 for addressing particular memory configurations and systems, subclasses 100 through 173 for memory accessing and control, per se, (in particular subclasses 113 for disk caching, subclasses 117 through 146 for hierarchical memory, per se, (including caching), subclasses 147 through 153 for shared memory accessing and control, subclasses 154 through 166 for memory control, maintenance and management techniques (including subclasses 161 and 162 for archiving and backup under memory accessing and subclasses 163 and 164 for memory access limiting), and subclasses 170 through 173 for memory configuring and allocation), and subclasses 200 through 221 for address formation

processing, particularly subclass 216 for address hashing.

715, Data Processing: Presentation Processing of Document, appropriate subclasses for document presentation processing.

717, Data Processing: Software Development, Installation, and Management, appropriate subclasses for data processing software development tool.

## **SECTION IV - GLOSSARY**

The terms below have been defined for purposes of classification in this class and are shown in underlined type when used in the class and subclass definitions. When these terms are not underlined in the definitions, the meaning is not restricted to the glossary definitions below.

### **ADDRESS DATA**

Data that represent or identify a source or destination. (Also see Data)

### **COMPUTER:**

A machine that inputs data, processes data, stores data, and outputs data.

### **DATA**

Representation of information in a coded manner suitable for communication, interpretation, or processing. See Address Data, Instruction Data, Status Data, and User Data in this Glossary.

### **DATABASE**

A collection of data arranged for ease of storage, retrieval, updating, searching and sorting by computerized means.

### **DATA PROCESSING**

See Processing, below.

### **DIGITAL DATA PROCESSING SYSTEM:**

An arrangement of processor(s) in combination with either memory or peripherals, or both, performing data processing.

### **FILE**

A named collection of data.

### **INFORMATION**

Meaning that a human being assigns to data by means of the conventions applied to that data.

### **INSTRUCTION DATA**

Data that represent an operation and identify its operands, if any. (Also see Data)

### **MEMORY**

A functional unit to which data can be stored and from which data can be retrieved.

### **PERIPHERAL**

A functional unit that transmits data to or receives data from a computer to which it is coupled.

## PROCESSING

Methods or apparatus performing systematic operations upon data or information exemplified by functions such as data or information transferring, merging, sorting, and calculating (i.e., arithmetic operations or logical operations).

(1) Note. In this class, the glossary term data is used to modify processing in the term data processing; whereas the term digital data processing system refers to a machine performing data processing.

(2) Note. In an effort to avoid redundant constructions, in this class, where appropriate, the term address data processing is used in place of address data data processing.

## PROCESSOR

A functional unit that interprets and executes instruction data.

## STATUS DATA

Data that represent conditions of data, computers, peripherals, memory, etc. (Also see Data)

## USER DATA

Data other than address data, instruction data, or status data. (Also see Data)

## SUBCLASSES

### 1 DATABASE OR FILE ACCESSING:

This subclass is indented under the class definition. Subject matter directed to the retrieval of data stored in a database or as computer files, where a file is defined as a named collection of data.

(1) Note. This class is directed to computerized database and file accessing and retrieval, including hierarchical, bit-mapped and flat indexing, hashing, stapling, containerizing, and other methods. Accessing and control of a memory, per se, is classified elsewhere. See the search class notes below.

(2) Note. The combination of details of database technology with the business data processing is classified in the business art. See search class notes below.

(3) Note. The combination of details of database technology with a nominal recitation of the subject matter of another class is classified herein. Particular fields of use of database technology performing in combination with the basic subject matter of another class to effect some end other than mere information accessing or retrieval is classified with the subject matter of the other class, unless specifically excluded therefrom. See the search class notes below.

(4) Note. This class is directed to generic methods and apparatus for accessing and retrieving data housed in either databases or files. The generic steps to access and retrieve an object from an object-oriented database may be properly classified herein; however, objects themselves for an application other than database accessing and retrieving data, such as, for example an operator interface object, an icon object capable of instantiating a process, or a simulation system physical structure object are classified elsewhere. See the search class notes below.



(5) Note. This class is directed to generic methods and apparatus for accessing and retrieving data housed in either databases or files. The generic steps of accessing and retrieving data or information in a particular computer design "environment" may be properly classified herein. Examples of such "environments" include, for example, a computer aided design (CAD) and analysis tool "environment", a software development tool "environment", an image processing "environment", a desk-top or other operator interface "environment", etc., may rely on accessing and retrieving information or routines from libraries while working in the "environment". The "environments" themselves are classified elsewhere in the data processing arts. See the search class notes below.

(6) Note. The combination of a database accessing method with a particular operator interface feature may be found in these subclasses. Operator interfaces, per se, are classified elsewhere. See the search class notes below.

(7) Note. KEYWORDS: Directory, hierarchy, hierarchical, tree, indexing, pointers, folders, books, bit map, hashing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

100+, for data structures, per se.

102, for indexing, per se, in the creation of a database.

SEE OR SEARCH CLASS:

128, Surgery, subclasses 630+ for diagnostic testing and appropriate subclasses for applications of computers in the life sciences including patient monitoring and medical imaging.

273, Amusement Devices: Games, for games and amusements. Classes 463 and 473 will eventually replace 273.

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 867 for operator interfaces, per se, in particular subclasses 866 for interface customization, subclasses 764-862 for on-screen work or objects, and subclasses 810-845 for menus.

358, Facsimile and Static Presentation Processing, subclass 403 directed to facsimile document filing and retrieval system.

382, Image Analysis, for image recognition, transformation and sensing, per se, and applications therefor.

463, Amusement Devices: Games, for a specific type of amusement, recreation, or play activity.

472, Amusement Devices, for the amusement or recreation of human beings, and includes patents relating to devices of the type.

473, Amusement Devices: Games, for devices ancillary or appurtenant to games for which there is no provision in other classes.

700, Data Processing: Generic Control Systems or Specific Applications, subclasses 95 through 212 for manufacturing applications of computers.

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclasses 13 through 22 for the use of database in simulating electronic device and electrical system.

704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclass 10 for dictionary building in machine translation systems.

705, Data Processing - Financial, Business Practice, Management, or Cost/Price Determination, subclasses 1+ for applications of databases in business transaction processing.

- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 1 through 5 for addressing particular memory configurations and systems, subclasses 100+ for memory accessing and control, per se, and in particular subclasses 113 for disk caching, subclasses 117+ for hierarchical memory, per se, subclasses 118+ for caching, subclasses 147+ for shared memory accessing and control, subclasses 170+ for memory configuring and allocation, subclasses 200+ for address formation processing, and subclass 216 for address hashing.
- 714, Error Detection/Correction and Fault Detection/Recovery, subclasses 15+ for state recovery, per se, in particular, subclass 20 for plural recovery sets with set interrelation data.
- 715, Data Processing: Presentation Processing of Document, appropriate subclasses for document processing, per se, particularly subclass 501.1 for processing a document including hypermedia, subclass 513 for processing a structured document (e.g., HTML, SGML, ODA, CDA), and subclasses 515-516 for compound documents.
- 716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, appropriate subclasses for the use of database in the design and analysis of circuit or semiconductor mask.

## 2 **Access augmentation or optimizing:**

This subclass is indented under subclass 1. Subject matter directed to methods of access, including query path traversal, mapping, and reuse, joining tables in relational databases, view composition, index choice, bit mapping, and query reuse.

SEE OR SEARCH CLASS:

- 340, Communications: Electrical, subclasses 825.01 through 825.04 for selective communications path routing.
- 701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 200+ for navigation within a physical reality.
- 704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclass 10 for linguistics dictionary building.
- 705, Data Processing - Financial, Business Practice, Management, or Cost/Price Determination, subclasses 7+ for operations research, per se, including systems directed to generalized linear programming problem solving.
- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 490+ for arithmetical processing of data.
- 709, Electrical Computers and Digital Processing Systems: Multicomputer Data Transferring or Plural Processor Synchronization, subclasses 201 through 203 for distributed data processing.
- 710, Electrical Computers and Digital Data Processing Systems: Input/Output, subclasses 131 through 132 for bus path selecting in a computer or digital data processing system.
- 714, Error Detection/Correction and Fault Detection/Recovery, subclass 4 for masking or reconfiguring of network paths.
- 715, Data Processing: Presentation Processing of Document, subclass 501.1 for processing a document including hypermedia, subclass 513 for processing a structured document (e.g., HTML, SGML, ODA, CDA), subclasses 515-516 for compound documents, and subclass 532 for text data document processing with a dictionary.
- 718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for identifying and dealing with run-time dependencies between executing programs, tasks, and processes (e.g., data dependencies, control flow dependencies, etc.), particularly subclass 106 for dependency based cooperative processing of multiple

programs working together to accomplish a larger task.

### **3 Query processing (i.e., searching):**

This subclass is indented under subclass 1. Subject matter directed to methods of searching for (i.e., querying) data stored as a database in a computer or digital data processing system, including sequential searching, primary and secondary index searching, and bit-map searching of inverted lists or topological maps.

(1) Note. The combination of a database accessing method with a particular operator interface feature may be found in these subclasses. Operator interfaces, per se, are classified elsewhere.

SEE OR SEARCH CLASS:

- 178, Telegraphy, subclasses 18+ for writing systems such as, for example, digitizing tablets.
- 235, Registers, subclasses 375+ for systems controlled by data bearing member.
- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 156+ for input devices such as mice, touch screens, etc., subclasses 700-867 for operator interfaces, per se, and in particular subclasses 764-862 for on-screen workspaces and objects, subclasses 781-807 for windowing, and subclass 808 for pop-up controls.
- 353, Optics: Image Projectors, subclass 25 for selective optical data retrieval.
- 704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 1+ for machine translation and linguistic data processing and subclasses 200+ for speech translation methods and apparatus.
- 706, Data Processing: Artificial Intelligence, subclasses 45 through 61for input means in a knowledge-based system.
- 715, Data Processing: Presentation Processing of Document, subclasses 530 through 541for text editing, composition or storage control.
- 717, Data Processing: Software Development, Installation, and Management, subclasses 136 through 161for program compilers and procedural language translators.

### **4 Query formulation, input preparation, or translation:**

This subclass is indented under subclass 3. Subject matter directed to methods for translating an external access to a database or files into internal access to the database or files, and translation of an external query format into an intermediate or internal query format.

SEE OR SEARCH CLASS:

- 715, Data Processing: Presentation Processing of Document, subclasses 503 through 510for spreadsheets, forms, and tables under document processing.

**5 Query augmenting r refining (e.g., inexact access):**

This subclass is indented under subclass 3. Subject matter directed to methods of expanding or limiting access to and retrieval of data or files by techniques including fuzzy search, ranking or weighing, relevance, thesaurus, and concept retrieval.

SEE OR SEARCH CLASS:

- 704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 1+ for linguistic data processing and machine translation.
- 706, Data Processing: Artificial Intelligence, subclasses 1 through 9 for fuzzy logic, per se, and subclasses 15-44 for knowledge processing, per se, including trainable neural nets and expert systems.
- 710, Electrical Computers and Digital Data Processing Systems: Input/Output, subclasses 200 and 240+ for limiting access to system resources and access arbitrating.
- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 163+ for memory access limiting.
- 713, Electrical Computers and Digital Processing Systems: Support, subclasses 200+ for security in computers or digital processing systems.
- 715, Data Processing: Presentation Processing of Document, subclasses 530 through 541 for text document editing, composition or storage control.

**6 Pattern matching access:**

This subclass is indented under subclass 3. Subject matter directed to methods employing determination of equivalence of retrieval keys and stored data by matching characteristic patterns of one data set with one or more characteristic patterns of a candidate data set.

(1) Note. This subclass includes text searching and indexing, per se, for database. Text presentation data processing is classified elsewhere.

SEE OR SEARCH CLASS:

- 382, Image Analysis, appropriate subclasses for image recognition, transformation, and sensing, per se, and applications therefor, particularly subclasses 181+ for image pattern recognition.
- 704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 2+ for machine translation systems.
- 705, Data Processing - Financial, Business Practice, Management, or Cost/Price Determination, subclasses 7+ for operations research, per se, including systems directed to generalized linear programming problem solving.
- 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 490+ for arithmetical processing, per se, and subclass 212 for detection of a particular sequence of bits.
- 714, Error Detection/Correction and Fault Detection/Recovery, for pertinent subclass(es) as determined by schedule review.
- 715, Data Processing: Presentation Processing of Document, appropriate subclasses for document processing, per se.
- 718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for identifying and dealing with run-time dependencies between executing programs, tasks, and processes (e.g., data dependencies, control flow dependencies, etc.), particularly subclass 106 for dependency based cooperative processing of multiple programs working together to accomplish a larger task.

programs working together to accomplish a larger task.

## 7 **Sorting:**

This subclass is indented under subclass 1. Subject matter directed to data oriented accessing methods benefiting from the creation of ordered lists.

(1) Note. For clarification, sorting includes elementary sorting methods such as selection sort, bubble sort, distribution counting, and other methods, such as Quicksort, Radix Sort, Priority Queues including heap sort, Selection and Merging, and External sort.

(2) Note. This subclass is for sorting database data or files. Generic sorting, per se, is classified elsewhere.

SEE OR SEARCH CLASS:

341, Coded Data Generation or Conversion, subclasses 50+ for digital code to digital code convertors.

712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclasses 1+ for sorter processing in computer and digital data system architecture and subclass 300 for generic string-level and bite-word order rearranging, bit-field insertion and extraction, and string length and sequence detecting.

## 8 **Concurrency (e.g., lock management in shared database):**

This subclass is indented under subclass 1. Subject matter directed to serialization of multiple accesses to the same unit of data or file for the purpose of data integrity.

(1) Note. Concurrency is related to controlling the ability of a plurality of users to simultaneously access the same (i.e., a single unit or copy of) information or proximately located information stored in a database or file (i.e., the ability to control "sharing" of information). Such control may involve the prioritizing or serializing of access to the "shared" information, or the copying of information into independent copies, which must ultimately be "integrated" for data coherency. Coherency, on other hand, although a related topic, is related to the maintaining of multiple copies of information in a database or file in a manner which ensures data integrity amongst the plurality of copies, regardless of whether a single user or plurality of simultaneous users are accessing the information. When a plurality of users are accessing the plurality of copies of information, then both concurrency and coherency concepts may be involved, and the subject matter may be properly classified herein based on hierarchy. Database or file coherency, per se, is classified elsewhere. Source code version management and software version management are classified elsewhere.

(2) Note. For clarification, the methods of ensuring data concurrency include employing time-stamping, semaphores, global and local shared locking (i.e., read only), and exclusive locking (i.e., read and write), multiple versioning, and temporal versioning, such as snapshots.

(3) Note. This subclass is directed to data integrity in database accessing and control. A concept search on this subject or the related subjects of data coherency and version management should consider the related topics as they appear in this class.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 716 through 726 for operator interface aspects of workgroup data processing environments for plural users or sites and cross-reference art collection 971 directed to interface aspects of cooperative decision support systems for groups of users.

- 705, Data Processing - Financial, Business Practice, Management, or Cost/Price Determination, subclasses 1 through 45 for automated financial or business practice or management systems and in particular subclasses 1 through 6 for file and database maintenance systems including data coherency in database systems.
- 710, Electrical Computers and Digital Data Processing Systems: Input/Output, subclass 200 for access locking.
- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 141 through 146 for cache memory data coherency, and subclasses 147 through 153 for sharing memory and prioritized access regulation.
- 715, Data Processing: Presentation Processing of Document, subclass 511 for document version management under document processing.
- 717, Data Processing: Software Development, Installation, and Management, subclass 122 for source code version management in a software programming environment, and subclasses 174 through 178 for software installation and version management of operating systems, application programs, and other executable programs.
- 718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for identifying and dealing with run-time dependencies between executing programs, tasks, and processes (e.g., data dependencies, control flow dependencies, etc.), particularly subclass 106 for dependency based cooperative processing of multiple programs working together to accomplish a larger task.

## 9 **Privileged access:**

This subclass is indented under subclass 1. Subject matter directed to determination and granting of access to data and files by direct means, such as by the file or database creator or database manager, or by indirect means, such as by inheritance, such as by group/user access profiles.

- (1) Note. This subclass is directed to access control in database systems. Computer system security is classified elsewhere.
- (2) Note. This subclass is directed to access control in database systems. The concept of access control exists throughout the class. Therefore, a search to a particular concept of access control should consider the related topics in bus access control, memory access control, computer system access control, generic access control, etc.

## SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 716 through 726 for operator interface aspects of workgroup data processing environments for plural users or sites.
- 710, Electrical Computers and Digital Data Processing Systems: Input/Output, subclasses 107+ for bus access regulating.
- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 147+ for shared memory access and control, and subclasses 163+ for access limiting and password use in memory accessing and control.
- 713, Electrical Computers and Digital Processing Systems: Support, subclasses 200+ for computer security per se.

**10 Distributed remote access:**

This subclass is indented under subclass 1. Subject matter directed to management of distributed database data and file access and retrieval, and retrieval of database data and files from a centralized or remote site.

SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 716 through 726 for operator interface aspects of workgroup data processing environments for plural users or sites and cross-reference art collection 971 directed to interface aspects of cooperative decision support systems for groups of users.
- 705, Data Processing - Financial, Business Practice, Management, or Cost/Price Determination, subclasses 1+ for automated business systems, per se, and in particular subclasses 26-27 for electronic shopping and catalogue browsing.
- 709, Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, subclasses 210 through 203 for multicomputer distributed data processing and subclasses 208-211 for multicomputer data transfer processing with master/slave arrangement.
- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 117 through 146 for hierarchical memory and caching, and subclasses 147+ for shared memory access and control.
- 712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclasses 1+ for processor, coprocessor arrangements.

**100 DATABASE SCHEMA OR DATA STRUCTURE:**

This subclass is indented under the class definition. Subject matter comprising means or steps for organizing and inter-relating data or files, including relational, network, hierarchical, and entity-relationship models, among others.

- (1) Note. Classification herein requires a combination of a data structure and the access or retrieval method, or apparatus for employing or storing the data structure.
- (2) Note. KEYWORDS: entity relational, entity attribute, relational, hierarchical and network databases, b-tree, temporal multi-key, superblock, cross-linked tree, referential constraints, linked list, dual linked, quad linked, inverted file, inverted list, vector relational object, hypertext data dictionary.

SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 867 for object-oriented operator interface elements, per se.
- 717, Data Processing: Software Development, Installation, and Management, appropriate subclasses for object-oriented programming environments, per se.

**101 Manipulating data structure (e.g., compressi n, c mpacti n, c mpilati n):**

This subclass is indented under subclass 100. Subject matter including data structure conversion, compression, compaction, and compilation, for optimization of database and file storing, and for data compatibility between different or multiple databases.

SEE OR SEARCH THIS CLASS, SUBCLASS:

8, for database concurrency management.

200, through 206, for file and database maintenance systems including data coherency in database systems.

SEE OR SEARCH CLASS:

341, Coded Data Generation or Conversion, subclasses 50 through 107for digital code to digital code data conversion.

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 716 through 726for operator interface aspects of workgroup data processing environments for plural users or sites and cross-reference art collection 971 directed to interface aspects of cooperative decision support systems for groups of users.

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclass 527 for aspects of data compatibility related to emulation.

708, Electrical Computers: Arithmetic Processing and Calculating, subclass 203 for computer data compression and decompression.

711, Electrical Computers and Digital Processing Systems - Memory, subclasses 141 through 146for cache memory data coherency, and subclasses 147-153 for sharing memory and prioritized access regulation.

712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclass 300 for generic string-level and byte-word level order rearranging, bit-field insertion and extraction, and string length and sequence detecting.

715, Data Processing: Presentation Processing of Document, subclass 511 for document version management under document processing.

717, Data Processing: Software Development, Installation, and Management, subclass 122 for source code version management in a software programming environment, and subclasses 174 through 178 for software installation and version management of operating systems, application programs, and other executable programs.

718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for identifying and dealing with run-time dependencies between executing programs, tasks, and processes (e.g., data dependencies, control flow dependencies, etc.), particularly subclass 106 for dependency based cooperative processing of multiple programs working together to accomplish a larger task.



## **102 Generating database r data structure (e.g., via user interface):**

This subclass is indented under subclass 100. Subject matter including means or steps for generating database schema and data structures.

(1) Note. This subclass accepts operator interface features for data structure development environments. Operator interfaces, per se, are classified elsewhere.

SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 867 for operator interfaces.
- 358, Facsimile and Static Presentation Processing, for facsimile producing systems.
- 382, Image Analysis, for image recognition, transformation and sensing, per se, and applications therefor, and in particular subclasses 181+ for image pattern recognition.
- 704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclass 10 for linguistics dictionary building.
- 706, Data Processing: Artificial Intelligence, subclasses 45 through 61 for knowledge processing system operator interface.
- 715, Data Processing: Presentation Processing of Document, subclass 501.1 for processing a document including hypermedia, subclass 513 for processing a structured document (e.g., HTML, SGML, ODA, CDA), subclasses 515-516 for processing a compound document using hierarchy control, subclasses 517 and 525 for document layout processing including spacing control, format transforming, etc., and subclass 532 for text data document processing with a dictionary.

## **103 Object-oriented database structure:**

This subclass is indented under subclass 100. Subject matter further comprising an object-oriented data structure and its maintenance in memory.

(1) Note. This subclass includes object-oriented data organization.

SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 764 through 862 for on-screen workspaces or objects, and subclasses 810 through 845 for menus.
- 703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclasses 13 through 22 for simulating electronic device and electrical system which may employ object-oriented data structure.
- 715, Data Processing: Presentation Processing of Document, appropriate subclasses for document processing, per se, in particular, subclass 501 for hypermedia, subclass 513 for structured documents (e.g., HTML, SGML, ODA, CDA), and subclasses 515-516 for compound documents.
- 716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, appropriate subclasses for designing and analyzing circuit or semiconductor mask which may include the use of libraries or objects.
- 717, Data Processing: Software Development, Installation, and Management, appropriate subclasses for software development tools, per se, including computer-aided software engineering and object-oriented programming environments.

#### **104.1 Application of database or data structure (e.g., distributed, multimedia, image):**

This subclass is indented under subclass 100. Subject matter directed to specific applications of database schema and data structures to commercial, scientific, and medical fields not provided for elsewhere.

(1) Note. The combination of details of database technology with the business data processing is classified in the business art. See SEE OR SEARCH CLASS notes below.

(2) Note. The combination of details of database technology with a nominal recitation of the subject matter of another class is classified herein. Particular fields of use of database technology, performing in combination with the basic subject matter of another class to effect some end other than mere information accessing or retrieval, is classified with the subject matter of the other class, unless specifically excluded therefrom. See the SEE OR SEARCH CLASS notes below.

#### **SEE OR SEARCH CLASS:**

- 382, Image Analysis, various subclasses for operations performed on image data with the aim of measuring a characteristic of an image, detecting variations, detecting structures, or transforming the image data, and for procedures for analyzing and categorizing patterns present in image data.
- 600, Surgery, subclasses 300 through 595 for diagnostic testing applications of computers in the life sciences including patient monitoring and medical imaging.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 90 through 306 for data structures in various computer-based applications and in combination with the basic subject matter of another class.
- 703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, appropriate subclasses for simulation.
- 704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 1 through 10 for linguistics.
- 705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, for business data processing.
- 706, Data Processing: Artificial Intelligence, appropriate subclasses for artificial intelligence.
- 717, Data Processing: Software Development, Installation, and Management, appropriate subclasses for software development tool.

#### **200 FILE OR DATABASE MAINTENANCE:**

This subclass is indented under the class definition. Subject matter directed to generic data, file, and directory upkeep, file naming, and file and database maintenance including integrity consideration, recovery, and versioning.

(1) Note. These subclasses are directed to means and steps for handling of generic files and databases only in computers and digital data processing systems. For the purpose of these definitions, a generic file is defined as a named collection of data. File content and database content authoring, generating, producing, and editing in information processing applications art areas, such as, for example, business data processing machine translation, graphics processing, simulation, animation and software development, is classified elsewhere. See the search class notes below.

(2) Note. This subclass is directed to management and maintenance of files and databases in computers and digital data processing systems and accepts subject solutions working within single memories and across multiple memories. Memory accessing and control and memory management, per se, is classified elsewhere.

(3) Note. This subclass is directed to management and maintenance of files and databases in computers and digital data processing systems and accepts only nominal recitations to operator interfaces, icons and other metaphors used in the maintenance of files and databases. File management tools, metaphors or objects with significant operator interface features are classified elsewhere. See the search class notes below.

(4) Note. Formatting and file allocation in memory systems such as direct access storage systems is generally found in the art area directed to the storage system device.

(5) Note. KEYWORDS: file caching, differential file, incremental file, merge up-date, (re)naming, name standardization, file deletion, directory maintenance, file replication.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1, for database content authoring tools.
- 102, for database data structure generating, per se.

SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclass 866 for file content authoring, generating, producing, and edit in operator interface customization and editioning, and subclasses 467+ for file content authoring, generating, producing, and editing in font generation and animation.
- 703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclasses 13 through 22 for file content authoring, generating, producing, and editing in simulating electronic device and electrical system; and subclasses 23 through 28 for file content authoring, generating, producing, and editing in emulation systems.
- 704, Data Processing - Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 2+ for file content authoring, generating, producing, and editing in machine translation, per se.
- 705, Data Processing - Financial, Business Practice, Management, or Cost/Price Determination, subclasses 1+ for file content authoring, generating, producing, and editing in business data processing.
- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 100+ for memory accessing and control, per se, and subclasses 154-166 for memory control, maintenance, and management techniques.
- 715, Data Processing: Presentation Processing of Document, appropriate subclasses for file content authoring, generating, producing, and editing in document processing, word processing, and text processing.
- 716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, appropriate subclasses for file content authoring, generating, producing, and editing in designing and analyzing circuit or semiconductor mask.
- 717, Data Processing: Software Development, Installation, and Management, appropriate subclasses for file content authoring, generating, producing, and editing in software development environments, per se.

201 **C herency (e.g., same view t multiple users):**

This subclass is indented under subclass 200. Subject matter further comprising means or steps for distributed and temporal database management to ensure presentation of the same data or view to one or a plurality of users.

(1) Note. Coherency is related to the maintaining of multiple copies of information in a database or a file in a manner which ensures data integrity amongst the plurality of copies, regardless of whether a single user or plurality of simultaneous users are accessing the information. When a plurality of users is accessing the multiple copies of information, then both concurrency and coherency concepts may be involved, and the subject matter is classified in the concurrency subclass above.

(2) Note. This subclass is directed to file and database coherency and may include file caching. Caching, per se, however, is classified elsewhere. In addition, cache memory entry replacement strategies are classified elsewhere.

(3) Note. This subclass is directed to file and database coherency and may include management of transactions against a database by means of commit procedures. Transaction management, per se, is classified elsewhere.

(4) Note. This subclass is directed to file and database coherency and may involve access control. Access control in combination with other data processing system methods or apparatus (e.g., memory), computer security, per se, and access control, per se, are classified elsewhere.

(5) Note. This subclass is directed to file and database coherency and may include recitations to shared memory. Managing shared memory, however, is classified elsewhere. Further, data transferring between computers or digital data processing systems is classified elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:

8, for database concurrency.

SEE OR SEARCH CLASS:

- 345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 716 through 726 for operator interface aspects of workgroup data processing environments for plu users or sites and cross-reference art collection 971 directed to interface aspects of coop decision support systems for groups of users.
- 709, Electrical Computers and Digital Processing Systems: Multicomputer Data Transferring or Plural Processor Synchronization, subclasses 213 through 216 for multicomputer data transferring with shared memory.
- 710, Electrical Computers and Digital Data Processing Systems: Input/Output, subclass 200 for access control, per se.
- 711, Electrical Computers and Digital Processing Systems - Memory, subclasses 141 through 146 for cache coherency, and subclasses 147-153 for shared memory accessing and control.
- 714, Error Detection/Correction and Fault Detection/Recovery, subclasses 15+ for process and data state recovery, per se, and in particular subclass 20 for use of plural data sets (i.e., logs) containing set interrelation data, and subclass 49, for state error detection, per se.
- 715, Data Processing: Presentation Processing of Document, subclass 511 for document version management under document processing.
- 718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for identifying and dealing with run-time dependencies between executing programs, tasks, and processes (e.g., data dependencies, control flow dependencies, etc.), particularly subclass 106 for dependency based cooperative processing of multiple programs working together to accomplish a larger task.
- 719, Electrical Computers and Digital Processing Systems: Interprogram Communication or Interprocess Communication (IPC), appropriate subclasses for interprocess and interprogram communication.

**202 Recoverability:**

This subclass is indented under subclass 201. Subject matter including means or steps for transaction logging, log recovery, and recovery of data in the event of a fault.

(1) Note. This subclass is directed to fault recovery in combination with file or data maintenance. Fault recovery, per se, is classified elsewhere.

**SEE OR SEARCH CLASS:**

- 714, Error Detection/Correction and Fault Detection/Recovery, subclasses 1+ for reliability and availability, per se, subclass 15 for process and data state recovery, per se, and in particular subclass 20 for use of plural data sets (i.e., logs) containing set interrelation data.

### 203 **Versi n management:**

This subclass is indented under subclass 201. Subject matter further comprising means or steps for maintenance and management of multiple copies of database information or files on a computer.

(1) Note. Database concurrency, file or database coherency, and document version management are classified elsewhere in this class. See the SEE OR SEARCH THIS CLASS, SUBCLASS references below and also the line notes and search notes associated therewith.

(2) Note. Software component managing in a software development tool, software upgrading or updating (e.g., plural version management), and software installation are classified elsewhere. See the SEE OR SEARCH CLASS references below and also the line notes and search notes associated therewith.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8, for concurrency in database or file accessing.
- 201, for file or database coherency.
- 511, for document version management.

SEE OR SEARCH CLASS:

- 715, Data Processing: Presentation Processing of Document, subclass 511 for document version management.
- 717, Data Processing: Software Development, Installation, and Management, subclasses 120 through 123, 168-173, and 174-178 for software component managing in a software development tool, software upgrading or updating (e.g., plural version management), and software installation, respectively.

### 204 **Archiving or backup:**

This subclass is indented under subclass 201. Subject matter further comprising means or steps for backing up database information or files, file migration to and from high density nonvolatile storage, and immediate, delayed, and scheduled backup.

(1) Note. This subclass is directed to file and database coherency and aspects thereof directed to making copies for expressed purposes. Means and steps for controlling memory access to data (i.e., addressing, per se) during the act of backing up or archiving is classified elsewhere.

SEE OR SEARCH CLASS:

- 711, Electrical Computers and Digital Processing Systems - Memory, subclass 113 for cache by DASD, subclass 114 for RAID, subclasses 117+ for hierarchical memory accessing and controlling, per se, subclasses 133-136 for cache entry replacement strategies, subclasses 159-160 for memory accessing and control entry replacement strategies, per se, subclasses 161-162 for archiving and backup under memory accessing, and subclass 165 for internally relocating data.
- 714, Error Detection/Correction and Fault Detection/Recovery, subclass 6 for memory or peripheral subsystem fault recovery including access to redundant stored data, such as, error correction coded data, subclass 15 for process and data state recovery, per se, and in particular subclass 20 for use of plural data sets (i.e., logs) containing set interrelation data.

**205 File allocation:**

This subclass is indented under subclass 200. Subject matter further comprising means or steps for reserving memory space or organizing memory space in order to contain a file.

(1) Note. This subclass is directed to reserving memory space or organizing memory space in order to contain a file. Memory accessing and control for data is classified elsewhere. A concept search to allocation should consider both areas.

SEE OR SEARCH CLASS:

711, Electrical Computers and Digital Processing Systems - Memory, subclasses 1 through 5 for addressing specific memory configurations, subclasses 100+ for disk defragmenting, subclasses 170+ for memory accessing and control memory configuring and partitioning, per se, subclasses 200+ for address formation, subclass 209 for addressing plural pages, blocks, segments, etc.

**206 Garbage collection:**

This subclass is indented under subclass 205. Subject matter further comprising means or steps for deallocating of obsolete or unreferenced files and database objects, and maintenance of associated directories or links.

(1) Note. This subclass is directed to reorganizing of memory space, by deallocating unused, redundant, obsolete, or unreferenced database and file information, in order to increase the efficiency of memory space usage. The related concepts of memory reclamation and disk defragmentation do not take into account the interrelatedness of the database and file information. However, techniques used in memory reclamation and disk defragmentation may be relevant to the subject matter in this subclass, and a concept search on garbage collection should carefully consider related concepts classified under memory accessing and control entry replacement strategies and memory configuring.

SEE OR SEARCH CLASS:

711, Electrical Computers and Digital Processing Systems - Memory, subclasses 133 through 136 for cache entry replacement strategies, subclasses 159 through 160 for memory accessing and control entry replacement strategies, per se, and subclasses 170+ for memory accessing and control memory configuring and partitioning, per se.

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